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Part-2

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Syllabus and Exam Scheme of the written exam (Objective Type) for the Post of Food Safety Officer under Food Safety and Drug Administration Department, Uttarakhand

➢ Exam Scheme

Exam scheme for the post of Food Safety Officer is as follows-

1. Written exam (Objective Type)

S. No	Subject	No. of Questions	Maximum Marks	Time
1	FOOD TECHNOLOGY AND GENERAL STUDIES	200	200	03 Hours

2. Interview (Personality Test) – 25 Marks

Note:-**1**. The written examination will be of objective type, in which the negative evaluation method will be adopted. For each wrong answer given by a candidate to a question or for more than one answer given by a candidate to the same question (even if one of the answers given is correct), one-fourth (1/4) mark of the marks prescribed for that question will be deducted.

2. Final Merit list will be prepared on the basis of a total of marks obtained by the candidate in the Written Exam and Interview/Personality Test.

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➢ SYLLABUS FOR FOOD SAFETY OFFICER

"FOOD TECHNOLOGY AND GENERAL STUDIES"

Total Questions: 200 **Total Time: 3hrs** **Total Marks: 200**

Part A: Food Technology

Total Questions: 180 **Total Marks: 180**

Unit 1. Food Chemistry and Human Nutrition

Structure and functions of carbohydrates**,** protein, fat, and vitamins. Occurrence of minerals, toxicity of heavy metals (As, Cd, Pb, Hg etc.) and pesticides. Anti-nutritional factors and their effect on human health; methods of their removal from foods. Role of Enzymes in food processing**.** Nutraceuticals and functional foods, organic foods, genetically modified foods. Natural and synthetic colouring; flavouring agents and their impact on human health. Food and nutrition, its functions, classification and sources. Balanced diet and recommended dietary allowance (RDA), Food contaminants, adulterants and their effects on human health. Causes and prevention of malnutrition.

Unit 2. Food Microbiology and Food Hygiene

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Principles of food microbiology, role of microbes in food quality, fermented food, food spoilage, food borne pathogens, poisoning and diseases. Sources of microorganisms in food chain (raw materials, water, air, equipment and handler etc.) and methods of evaluating microbiological quality of foods-culture dependent and culture independent methods with special reference to yeast, mould, protozoan, bacteria and virus. Principles and techniques in microbiological examination of foods and water. Indicator microbes, Presumptive test (Most Probable Number) and confirmatory count methods. Beneficial microorganisms and their role in food processing. Single Cell Protein (SCP), Prebiotics and Probiotics. Methods of detecting, Anti-microbial resistance in food and water borne pathogens. Role of microbes affecting the quality & shelf life of processed foods with special emphasis on psychrophiles, mesophiles, halophiles and thermophiles.

Unit 3. Food Preservation, Processing and Packaging

Principles and Operations of Food Processing in food grains, pulses, legumes, edible oil seeds, fruits, vegetables, spices, condiments, Tea, Coffee, sugar, jaggery, confectionery, bakery, beverages, dairy, egg, meat and aqua food

products. Food preservation, its principles and methods including novel and emerging technology. Food additives with respect to their technological functions and safe limits. Food packaging methods and principles including novel packaging materials and techniques. Food labelling, storage and transportation practices. Ready to eat Indian street foods. By product utilization of food industry.

Unit 4. Food Analysis and Quality

Fundamentals of field and laboratory sampling with statistical tools, maintenance of chain of evidence and transportation conditions in terms of aerobic and anaerobic microbes. Basic/classical methods of food analysis. Analytical techniques including HPLC, GC, AAS, NIR, NMR, FTIR, TEM, SEM, Fluorescent microscopy, UV-VIS Spectrophotometry, GC-MS and molecular techniques. Food quality definition, attributes and role in food industry. Sensory quality evaluation and its methods. Principles and need of quality assurance and quality control. Detection of common adulterants in various foods products. Methods of detecting toxins. Principles of food safety management system including traceability and recall - Sanitation, Hazard Analysis Critical Control Points (HACCP), Good Manufacturing Practices (GMP), Good Laboratory Practices (GLP), Good Agricultural Practices (GAP) and Good Hygienic Practices (GHP). Legal aspects related to food safety. Food safety management system (FSMS)- ISO: 22000; Quality Management system (QMS)- ISO: 9001. Total Quality Management. ISO certification. Food Fraud, Personal Hygiene, Pest and Rodent control; Food Plant sanitation and Hygiene. Food Hazard. Methods of detecting radiation and radioactivity.

Unit 5. Indian and International Food Laws

Food Safety and Standards Act of India 2006 and Food Safety and Standards Rules and Regulations – 2011: Provision, definitions and different sections of the act and implementation. Role of relevant national bodies, e.g. APEDA and Spice Board etc. International Food Control Systems/Laws, Regulations and Standards/Guidelines with regard to Food Safety: CODEX Alimentarius Commission (CAC) - history, members, standard setting and advisory mechanism, Joint Expert Committee on Food Additives (JECFA), Joint FAO/WHO Expert Meeting on Microbiological Risk Assessment (JEMRA), Joint meeting on Pesticide Residues (JMPR), WTO agreements - Sanitary and Phyto Sanitary measures/Technical Barriers to Trade (SPS/TBT) related to food items. National and international accreditation bodies and procedures. Bureau Indian Standard (BIS), AGMARK, Coffee Board, Tea Board, Essential commodities act, Consumer protection act.

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Unit 6. Food Safety and Standards Authority of India (FSSAI) : Role, Functions and Initiatives

Structure and Functions of Food Authority, systems and processes in Standards, Enforcement, Laboratory ecosystem, imports, Third Party Audit etc. Promoting safe and wholesome food (Eat Right India, Food Fortification, Special Nutrition Programme (SNP)), Clean Street Food Hub, Repurpose Used Cooking Oil (RUCO), hygiene rating and various other social and behavioural change initiatives. Role of State Food Authorities.

Unit 7. Public Health Challenges

Definition, history and current scenario of Public Health. Concept of Health and Disease. Determinants and Dimensions of Health; Level of prevention. Clinical and dietary survey, Programs of nutrition in India (Mid-day meals at schools, Anganwadi systems, ICDS, NIDDCP, NNAPP, WIFS, National food security mission, SABLA, FSSAI initiatives on food fortification, FFRC). Importance of diet in alleviating health risks, especially non-communicable diseases and increasing cancer cases. Epidemic dropsy, Lathyrism, Epidemic fluorosis, Iodine deficiency disorder (IDD) etc. Epidemic, endemic and pandemic, out-break investigation and their methods.

Part B: General Studies

Total Questions:20 **Total Marks:20**

Unit 8. General Studies

General Science; Computer Literacy; Current events of State, National and International importance; History of India, Indian National Movement, Indian Polity, Economy, Geography; Population, Culture, Sports, Food & Agriculture, Religion, Festivals etc. with special reference to Uttarakhand.

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CHAPTER 21

Sampling, Chain of Evidence and Classical Analysis

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1. Which of the following best defines a "lot" in the context of food sampling principles?
(A) A quantity of food produced under uniform conditions
(B) A single sample unit drawn from a larger bulk container
(C) A mixture of primary samples combined for testing
(D) A theoretical model representing an infinite population

2. Consider the following statements regarding simple random sampling:
I. Every individual item in the lot has an equal and independent chance of being selected.
II. It completely eliminates all forms of sampling error and statistical variance.
III. It typically requires the use of random number generators or specific tables.
IV. It is the most effective method for analyzing highly stratified and heterogeneous bulk silos without sub-division.
Which of the statements given above are correct?
(A) I and II only
(B) I and III only
(C) II and IV only
(D) I, III and IV only

3. Which of the following statements correctly describes sampling error in food analysis?
(A) The difference between the sample estimate and the true population value
(B) The procedural error introduced by the laboratory analyst during titration
(C) The instrumental variation eliminated by using highly sensitive equipment
(D) The systematic error arising exclusively from non-probabilistic selection

4. Stratified sampling is often preferred over simple random sampling for heterogeneous food lots because:
(A) It allows inspectors to select the most visibly defective items from the lot
(B) It completely bypasses statistical probability to speed up field collection
(C) It combines all distinct sub-populations into a single representative sample
(D) It divides the population into homogeneous subgroups to reduce sampling variance

5. Given below are two statements, one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Composite sampling involves mixing multiple discrete samples together before laboratory analysis.
Reason (R): Composite sampling is primarily used to isolate and identify localized hotspots of microbial contamination within a large lot.
(A) Both A and R are true and R is the correct explanation of A
(B) Both A and R are true but R is not the correct explanation of A
(C) A is true but R is false
(D) A is false but R is true

6. A Food Safety Officer (FSO) needs to estimate the average moisture content of an entire continuous production line of biscuits spanning an 8-hour shift. Which sampling technique is most appropriate to ensure temporal representation?
(A) Convenience sampling at the beginning of the shift
(B) Stratified sampling based only on the size of the biscuits
(C) Systematic sampling by taking a sample every 30 minutes
(D) Judgmental sampling of the darkest baked biscuits

7. Consider the following statements regarding composite samples:
Statement I: A composite sample reduces the analytical cost and time by minimizing the total number of tests required to determine average

lot quality.
Statement II: A composite sample is highly effective for detecting trace levels of volatile chemical adulterants that are unevenly distributed in a bulk liquid.
(A) Both Statement I and Statement II are correct
(B) Both Statement I and Statement II are incorrect
(C) Statement I is correct but Statement II is incorrect
(D) Statement I is incorrect but Statement II is correct

8. Match the sampling types in List-I with their correct descriptions in List-II.
List I: Sampling Types
P. Stratified sampling
Q. Systematic sampling
R. Convenience sampling
S. Random sampling
List II: Descriptions
I. Items are selected at regular intervals
II. Lot is divided into distinct zones before sampling
III. Every unit has an equal chance of selection
IV. Items are chosen based on accessibility
(A) P-II, Q-I, R-IV, S-III
(B) P-I, Q-II, R-III, S-IV
(C) P-II, Q-IV, R-I, S-III
(D) P-IV, Q-I, R-II, S-III

9. Which of the following statements regarding sampling plans is incorrect?
(A) A sampling plan specifies the sample size and the criteria for lot acceptance or rejection
(B) An increase in sample size uniformly increases both the producer's risk and the consumer's risk
(C) Attribute sampling plans evaluate characteristics on a pass/fail or presence/absence basis
(D) Variable sampling plans require continuous measurement data such as weight or concentration

10. While sampling a batch of imported cheese, an FSO must decide whether to accept or reject the lot based on a microbiological specification. If the specification uses a three-class attributes plan, which competency must the FSO demonstrate?
(A) Evaluating data on binary presence or absence of a microbe
(B) Using m, M, and c values to classify the overall lot quality
(C) Calculating standard deviation of weights for legal compliance
(D) Mixing cheese samples into a composite to test against limit M

11. Arrange the following steps of a formal food sampling process in the correct chronological order:
I. Homogenization of the laboratory sample
II. Collection of primary field samples
III. Division of the sample into test portions
IV. Creation of a composite sample
(A) II, IV, I, III
(B) II, I, IV, III
(C) IV, II, I, III
(D) I, II, III, IV

12. Identify the correct pair regarding sampling tools and their intended food matrices:
(A) Trier – Homogeneous bulk liquids
(B) Dipper – Free-flowing dry grain
(C) Sterile scalpel – Solid meat cuts
(D) Thief probe – Viscous semi-solids like butter

13. In acceptance sampling, the Acceptable Quality Level (AQL) is defined as:
(A) The maximum percent of defective units that a consumer is willing to accept
(B) The probability of rejecting a food lot that meets the quality standards
(C) The absolute zero-defect threshold required for all regulatory food samples
(D) The maximum percent defective considered satisfactory as a process average

14. Which of the following is NOT a probabilistic sampling method?
(A) Simple random sampling
(B) Systematic sampling
(C) Judgmental sampling
(D) Cluster sampling

15. Identify the incorrect pair regarding statistical terminology in sampling:
(A) Population – The entire mass of food from which a sample is taken
(B) Consumer's Risk (β) – The probability of rejecting a good lot
(C) Sample size (n) – The number of units drawn from the lot
(D) Acceptance number (c) – Maximum allowed

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defective units in a sample

16. What is the definition of the Operating Characteristic (OC) curve in statistical sampling?
(A) A graph mapping moisture content against water activity across food products
(B) A plot showing the normal distribution of food weights on a production line
(C) A calibration curve used for standardizing chemical laboratory equipment
(D) A curve plotting acceptance probability against the actual lot defect rate

17. Consider the following statements regarding field sampling of liquid foods:
I. Static liquids in large tanks must be thoroughly agitated before sampling to ensure homogeneity.
II. Samples from a continuously flowing liquid stream should be taken systematically at predetermined time intervals.
III. Stratified sampling is unnecessary for bulk liquids that have settled over a long period.
IV. Sterile sampling devices are mandatory only if the liquid is intended for chemical analysis.
Which of the statements given above are correct?
(A) I and II only
(B) II and III only
(C) I, II and IV only
(D) I, III and IV only

18. Which of the following statements correctly differentiates between two-class and three-class attribute sampling plans?
(A) Two-class plans use variables like mean and standard deviation, whereas three-class plans use attributes
(B) Three-class plans are strictly used for chemical residues, while two-class plans are for food microbiology
(C) Two-class plans classify lots as acceptable/ defective, while three-class plans add a marginal category
(D) Two-class plans allow several samples to exceed the maximum limit M, whereas three-class plans never do

19. In a sampling plan, setting a very low acceptance number (c) causes:
(A) An increase in the producer's risk (α) because good lots are more likely to be rejected
(B) A decrease in the producer's risk (α) because the standards are more lenient
(C) An increase in the consumer's risk (β) because defective lots are more easily accepted
(D) No change in statistical risks, provided the sample size (n) remains constant

20. Given below are two statements, one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): When sampling highly perishable semi-solid foods, the sample must be immediately frozen using liquid nitrogen regardless of the target analyte.
Reason (R): Freezing prevents microbial degradation and enzymatic changes during transport to the laboratory.
(A) Both A and R are true and R is the correct explanation of A
(B) Both A and R are true but R is not the correct explanation of A
(C) A is true but R is false
(D) A is false but R is true

21. An analyst needs to draw a representative sample of wheat flour from a 50 kg gunny bag. Which of the following tools is most appropriate for this concept application?
(A) A sterile pipette
(B) A slotted trier
(C) A mechanical homogenizer
(D) A stainless steel dipper

22. Consider the following statements regarding statistical distributions in food analysis:
Statement I: In a perfectly normal distribution of analytical results, the mean, median, and mode are identical.
Statement II: If analytical data is heavily right-skewed due to contamination outliers, the mean will be lower than the median.
(A) Both Statement I and Statement II are correct
(B) Both Statement I and Statement II are incorrect
(C) Statement I is correct but Statement II is incorrect
(D) Statement I is incorrect but Statement II is correct

23. Match the field sampling techniques in List-I with their appropriate targets in List-II.
List I: Field Sampling Techniques
P. Aseptic sampling
Q. Core sampling

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R. Continuous drip sampling
S. Zonal sampling
List II: Targets
I. Solid blocks of cheese or frozen meat
II. Liquids flowing through pipelines
III. Assessing stratification in deep storage tanks
IV. Microbiological evaluation of milk
(A) P-IV, Q-I, R-II, S-III
(B) P-I, Q-IV, R-III, S-II
(C) P-IV, Q-II, R-I, S-III
(D) P-II, Q-III, R-IV, S-I

24. Which of the following statements about laboratory sub-sampling via "coning and quartering" is incorrect?
(A) It is an advanced instrumental technique requiring an electronic rotary divider
(B) It is primarily used for reducing the size of dry, granular, or powdered samples
(C) The sample is poured into a conical heap and flattened before division
(D) Opposite quarters of the flattened heap are discarded while the remaining two are retained

25. An FSO is preparing a laboratory sample from a large, heterogeneous field sample of nuts. To ensure proportional representation without causing moisture loss, which laboratory competency is most critical?
(A) Grinding the sample continuously for an hour to ensure absolute particle fineness
(B) Using a mechanical riffler to divide the sample into unbiased analytical portions
(C) Boiling the nuts to soften them completely before performing manual quartering
(D) Selecting only the visually perfect nuts for the final representative analysis

26. Arrange the following statistical calculations in the correct sequence to determine a 95% Confidence Interval for a sample mean:
I. Calculate the standard deviation (s)
II. Determine the sample mean ($\bar{x}$)
III. Multiply standard error by the appropriate critical value (t or z)
IV. Calculate the standard error of the mean ($s / \sqrt{n}$)
(A) II, I, IV, III
(B) II, I, IV, III
(C) IV, II, I, III
(D) I, IV, II, III

27. Identify the correct pair regarding variables used in a three-class attributes plan:
(A) m – The limit separating acceptable from marginally acceptable quality
(B) n – The maximum number of sample units allowed to exceed the limit M
(C) c – The total number of analytical sample units drawn from the entire lot
(D) M – The absolute minimum concentration of target bacteria for acceptance

28. In hypothesis testing for food data interpretation, the threshold value of significance level (α) is conventionally set at:
(A) 0.50 or 50%
(B) 0.95 or 95%
(C) 0.05 or 5%
(D) 1.00 or 100%

29. Which of the following parameters is NOT typically calculated to express the precision of analytical food data?
(A) Standard deviation
(B) Coefficient of variation
(C) Relative standard deviation
(D) P-value

30. Identify the incorrect pair regarding statistical tools in analysis:
(A) Mean – The arithmetic average of a data set
(B) Null Hypothesis (H_0) – Assumes no significant difference exists
(C) Variance – The square root of the standard deviation
(D) Degrees of freedom – Typically n - 1 for a single sample variance calculation

31. What is the precise definition of "Chain of Custody" in legal food sampling?
(A) The physical transportation of a legal sample from the collection field to the laboratory
(B) The chronological documentation recording the sequence of custody, transfer, and analysis
(C) The specialized chemical process used to stabilize an organic sample prior to extraction
(D) The statistical method used to determine the authenticity and origin of a food product

32. Consider the following statements regarding sample integrity and tracking:
I. A broken tamper-evident seal automatically

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invalidates a regulatory sample.
II. Unique alphanumeric barcodes are recommended over hand-written notes for sample tracking.
III. Legal samples require a signature from the FSO but not from the vendor at the time of seizure.
IV. The Chain of Custody ends once the sample enters the laboratory doors.
Which of the statements given above are correct?
(A) I and II only
(B) I, II and III only
(C) II and IV only
(D) I, III and IV only

33. Which of the following correctly describes the handling of reserve samples under FSSAI protocols?
(A) They are kept under specified storage conditions for potential re-analysis or review
(B) They are mixed with the primary sample to increase the overall testing sample volume
(C) They are discarded immediately if the initial screening analysis passes safety limits
(D) They are always sent directly to the food business operator for internal testing labs

34. Maintaining an unbroken Chain of Custody is critical because:
(A) It physically preserves the chemical and physical integrity of target analytes
(B) It prevents analytical laboratory instruments from drifting out of calibration
(C) It ensures the legal admissibility of the analytical results in a court of law
(D) It significantly accelerates the extraction phase during routine sample preparation

35. Given below are two statements, one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): In hypothesis testing, committing a Type I error means rejecting a true null hypothesis.
Reason (R): Type I error occurs when a food batch is deemed adulterated even though it complies with all safety standards.
(A) Both A and R are true and R is the correct explanation of A
(B) Both A and R are true but R is not the correct explanation of A
(C) A is true but R is false
(D) A is false but R is true

36. An FSO seizes a sample of suspected adulterated honey. During transit, the documentation detailing the sample origin is lost, though the physical jar remains sealed. Applying chain of evidence principles, the laboratory should:
(A) Proceed with analysis and generate new origin paperwork based on the FSO's memory
(B) Analyze the honey only for microbiological parameters rather than chemical adulteration
(C) Return the sealed jar to the original vendor and request an immediate replacement sample
(D) Reject the sample because the compromised chain of custody voids the legal evidence

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37. Consider the following statements regarding Type II errors in food analysis:
Statement I: A Type II error occurs when an analyst fails to reject a false null hypothesis.
Statement II: In a practical context, a Type II error implies accepting a hazardous or adulterated food lot as safe.
(A) Both Statement I and Statement II are correct
(B) Both Statement I and Statement II are incorrect
(C) Statement I is correct but Statement II is incorrect
(D) Statement I is incorrect but Statement II is correct

38. Match the sample documentation components in List-I with their primary functions in List-II.
List I: Sample Documentation Components
P. Tamper-evident seal
Q. LIMS identifier
R. Form VA / VI
S. FSO signature
List II: Primary Functions
I. Legal authorization and accountability of the sampling officer
II. Prevents undetected physical adulteration post-seizure
III. Digital tracking and data management in the laboratory
IV. Statutory documentation recording seizure details
(A) P-II, Q-III, R-IV, S-I
(B) P-III, Q-II, R-I, S-IV
(C) P-IV, Q-I, R-II, S-III
(D) P-II, Q-IV, R-III, S-I

39. Which of the following statements about sample labelling is incorrect?
(A) Labels must be securely attached to the container to prevent loss in storage
(B) The label must include the time, date, and exact location of the sampling
(C) The label should indicate the nature of any chemical preservatives added
(D) Pencil is preferred for writing labels as ink runs when exposed to moisture

40. An analyst receives a sealed legal sample but notes a discrepancy between the sample code on the jar and the code on the Chain of Custody form. The most competent course of action is to:
(A) Quarantine the sample and notify supervisors to resolve the discrepancy
(B) Alter the official tracking form to match the jar and begin analysis
(C) Alter the physical label on the jar to match the form and begin testing
(D) Discard the physical sample immediately and delete the digital record

41. Arrange the following actions in the standard sequence for securing a statutory food sample:
I. Packing and wrapping the divided portions securely
II. Applying the official seal and securing the signatures of witnesses
III. Dividing the representative sample into the required number of parts
IV. Issuing the appropriate legal notice/form to the vendor
(A) IV, III, I, II
(B) III, I, II, IV
(C) IV, I, III, II
(D) III, IV, II, I

42. Identify the correct pair regarding sample transport conditions:
(A) Frozen foods – Transported at ambient temperature to facilitate rapid thawing
(B) Microbiological samples (chilled) – Transported between 0°C to 4°C
(C) Dry grains – Transported submerged in sterile water
(D) Canned foods – Transported strictly below -18°C

43. In statistical hypothesis testing, the p-value represents:
(A) The probability of observing the results assuming the null hypothesis is true
(B) The exact statistical probability that the stated null hypothesis is true
(C) The overall percentage of defective food units present in the population
(D) The inherent analytical precision and accuracy of the laboratory instrument

44. Which of the following is NOT required on a standard legal food sample tracking form?
(A) Complete legal name and business address of the retail vendor
(B) Unique and secure sample identification code printed on the seal
(C) Nutritional profile of the item claimed by the manufacturer
(D) Exact calendar date and specific clock time of sample collection

45. Identify the incorrect pair regarding laboratory sample preparation techniques:
(A) Extraction – Separating analytes from the matrix using solvents
(B) Clean-up – Removing interfering substances from the extract
(C) Homogenization – Creating a uniform mixture of the test sample
(D) Digestion – Synthesizing new complex molecules for easier detection

46. What is the fundamental principle of Solid-Phase Extraction (SPE) used in sample clean-up?
(A) Heating and boiling the liquid sample to precipitate interfering protein bands
(B) High-temperature combustion of the sample to destroy organic food matrices
(C) Partitioning of analytes between a liquid mobile phase and a solid phase
(D) Passing an electrical current through a solid matrix to separate ionic species

47. Consider the following statements regarding the transport and storage of food samples:
I. Chemical preservatives are routinely added to samples intended for microbiological analysis.
II. Formalin may be added to raw milk samples intended for chemical analysis to prevent spoilage.
III. Samples for lipid analysis should be protected from light and oxygen to prevent autoxidation.
IV. Vegetative pathogens in food samples survive

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best when subjected to repeated freeze-thaw cycles.

Which of the statements given above are correct?

(A) I and II only
(B) II and III only
(C) III and IV only
(D) I, II and IV only

48. Which of the following statements correctly describes acid digestion in sample preparation?

(A) It utilizes mild acids at cold temperatures to extract intact dietary fibres
(B) It extracts volatile flavor compounds gently to prevent thermal degradation
(C) It relies on enzymatic breakdown of complex carbohydrates into simple sugars
(D) It uses strong acids and heat to destroy organic matter for mineral analysis

49. Transporting chilled food samples for microbiological analysis at ambient temperature is inappropriate because:

(A) It allows rapid mesophilic bacterial growth, distorting the original load
(B) It precipitates soluble food proteins, rendering the sample wholly unreadable
(C) It automatically invalidates the standard chemical preservation added by the FSO
(D) It causes widespread cold-shock death among resilient bacterial endospores

50. Given below are two statements, one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A): The QuEChERS method is widely used for sample preparation in pesticide residue analysis.

Reason (R): QuEChERS involves quick extraction using acetonitrile followed by dispersive solid-phase extraction for matrix clean-up.

(A) Both A and R are true and R is the correct explanation of A
(B) Both A and R are true but R is not the correct explanation of A
(C) A is true but R is false
(D) A is false but R is true

51. A laboratory must analyze lead (Pb) and cadmium (Cd) in a sample of leafy vegetables. Which sample preparation technique is most appropriate before atomic absorption spectroscopy?

(A) Wet ashing via microwave-assisted acid digestion
(B) Supercritical fluid extraction using CO_2
(C) Kjeldahl digestion using sulfuric acid and a catalyst
(D) Soxhlet extraction using petroleum ether

52. Consider the following statements regarding solvent extraction:

Statement I: The principle of "like dissolves like" dictates that non-polar solvents should be used to extract non-polar analytes such as lipids.

Statement II: Hexane is a highly polar solvent commonly used for the extraction of water-soluble vitamins.

(A) Both Statement I and Statement II are correct
(B) Both Statement I and Statement II are incorrect
(C) Statement I is correct but Statement II is incorrect
(D) Statement I is incorrect but Statement II is correct

53. Match the clean-up techniques in List-I with their separation mechanisms in List-II.

List I: Clean-up Techniques

P. Gel Permeation Chromatography (GPC)
Q. Liquid-Liquid Extraction (LLE)
R. Solid Phase Microextraction (SPME)
S. Derivatization

List II: Separation Mechanisms

I. Chemical modification of analyte to increase volatility/detectability
II. Adsorption/absorption of volatile analytes onto a fused silica fiber
III. Separation based on molecular size using porous beads
IV. Partitioning between two immiscible liquid phases

(A) P-III, Q-IV, R-II, S-I
(B) P-IV, Q-III, R-I, S-II
(C) P-III, Q-I, R-IV, S-II
(D) P-II, Q-IV, R-III, S-I

54. Which of the following statements about liquid-liquid extraction (LLE) is incorrect?

(A) It involves the partitioning of an analyte between an aqueous phase and an organic solvent
(B) Emulsion formation is a common problem encountered during LLE
(C) It requires the use of two miscible liquids to facilitate rapid analyte transfer

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(D) A separatory funnel is typically used to draw off the layers in classical LLE

55. An analyst is tasked with extracting crude fat from a powdered milk sample. If the analyst uses acid hydrolysis prior to solvent extraction, they are demonstrating competency in:
(A) Saponifying the free fatty acids to make them highly soluble in aqueous media
(B) Converting triglycerides into volatile methyl esters for immediate detection
(C) Removing all remaining moisture to prevent any downstream solvent degradation
(D) Breaking protein-lipid and carbohydrate-lipid bonds for complete fat release

56. In a case involving suspected pesticide contamination in apples, the lab utilizes the QuEChERS method. The initial step involves shaking the homogenized apple with acetonitrile and buffering salts. The primary purpose of adding salts (like $MgSO_4$ and NaCl) in this step is to:
(A) Induce phase separation between the aqueous and organic phases
(B) Increase the pH to systematically destroy organophosphate compounds
(C) Precipitate all proteins and carbohydrates out of the matrix
(D) Act as a primary chemical derivatizing agent for chromatography

57. Identify the correct pair regarding sample digestion reagents:
(A) Sodium hydroxide (NaOH) – Primary reagent for dry ashing in a muffle furnace
(B) Nitric acid (HNO_3) – Used widely as a strong oxidizing acid in wet ashing
(C) Boric acid (H_3BO_3) – Used to completely oxidize organic carbon to CO_2
(D) Hexane – Used to digest refractory silicates in soil-contaminated food

58. For the preservation of a water sample collected for heavy metal analysis, which chemical is typically added immediately after collection?
(A) Sodium thiosulfate solution
(B) Nitric acid to lower pH below 2
(C) Sterile buffered peptone water
(D) Concentrated formaldehyde solution

59. Which of the following is NOT a technique used for the clean-up of food extracts?
(A) Kjeldahl distillation
(B) Solid-phase extraction (SPE)
(C) Florisil column chromatography
(D) Gel permeation chromatography

60. Identify the incorrect pair regarding sample extraction terminology:
(A) Analyte – The specific chemical substance being measured
(B) Matrix – The non-analyte components of the food sample
(C) Supernatant – The solid residue remaining after centrifugation
(D) Eluate – The solvent containing the extracted analyte that exits a chromatography column

61. Water activity (a_w) is defined as:
(A) The total mass of free and bound water molecules present within a given food matrix
(B) The percentage of volatile moisture lost when heated in a hot air oven at 105°C
(C) The physical migration of moisture from a zone of low humidity to high humidity
(D) The ratio of water vapor pressure in food to that of pure water at equal temperature

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62. Consider the following statements regarding the Karl Fischer titration method:
I. It is a chemical method used specifically for determining moisture content.
II. The reaction relies on the oxidation of sulfur dioxide by iodine in the presence of water.
III. It is only applicable to foods with a moisture content greater than 50%.
IV. It requires pyridine or an organic base as a buffering agent.
Which of the statements given above are correct?
(A) I, II and IV only
(B) I and III only
(C) II, III and IV only
(D) I, II, III and IV

63. Which of the following correctly differentiates dry ashing from wet ashing?
(A) Dry ashing involves strong acids and low heat, while wet ashing uses a muffle furnace
(B) Dry ashing uses high heat (550°C) without acids, while wet ashing uses liquid acids
(C) Dry ashing is faster and completely avoids volatile trace mineral loss during heating
(D) Dry ashing is used only for heavy metal analysis, while wet ashing is for total ash

64. Heating a sample containing high levels of fructose in a standard hot air oven at 105°C for moisture determination often leads to an overestimation of moisture content because:
(A) Fructose chemically binds to water molecules, strongly preventing evaporation
(B) Fructose molecules actively absorb nitrogen from the air at high temperatures
(C) The Maillard reaction creates additional water molecules trapped in the matrix
(D) Fructose decomposes thermally, losing volatile by-products alongside water

65. Given below are two statements, one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Vacuum ovens are preferred over conventional hot air ovens for moisture determination in high-sugar or heat-sensitive foods.
Reason (R): Vacuum ovens operate at reduced pressure, allowing water to boil and evaporate at a significantly lower temperature.
(A) Both A and R are true and R is the correct explanation of A
(B) Both A and R are true but R is not the correct explanation of A
(C) A is true but R is false
(D) A is false but R is true

66. An FSO needs to measure the moisture content of an essential oil-rich spice like cloves. Applying the appropriate classical method, which technique should be utilized to avoid interference from volatile oils?
(A) Standard hot air oven drying at 130°C
(B) Rapid open flame incineration
(C) Dean-Stark toluene co-distillation
(D) Instrumental hand refractometry

67. Consider the following statements regarding instrumental measurement of water activity (a_w):
Statement I: The chilled mirror dew point method measures the temperature at which condensation forms on a mirror, directly relating to the equilibrium relative humidity.
Statement II: Capacitance sensors measure changes in electrical capacitance of a polymer layer as it absorbs moisture from the headspace.
(A) Both Statement I and Statement II are correct
(B) Both Statement I and Statement II are incorrect
(C) Statement I is correct but Statement II is incorrect
(D) Statement I is incorrect but Statement II is correct

68. Match the moisture and ash analytical methods in List-I with their key characteristics in List-II.
List I: Moisture and Ash Analytical Methods
P. Karl Fischer Titration
Q. Muffle Furnace
R. Dean-Stark Method
S. Vacuum Oven
List II: Key Characteristics
I. Employs a solvent immiscible with water (e.g., Toluene)
II. Uses reduced pressure to dry heat-sensitive foods
III. Specific chemical reaction measuring trace water
IV. Operates typically at 550°C for proximate ash
(A) P-III, Q-IV, R-I, S-II
(B) P-IV, Q-III, R-II, S-I
(C) P-III, Q-I, R-IV, S-II
(D) P-I, Q-IV, R-III, S-II

69. Which of the following statements about muffle furnace parameters for dry ashing is incorrect?
(A) The standard temperature for determining total ash is usually between 500°C and 600°C
(B) Crucibles are put in pre-heated furnace without prior charring to speed oxidation
(C) Platinum, silica, or inert porcelain crucibles are commonly used during this test
(D) The process is complete when the ash is white or light gray, indicating carbon removal

70. While analyzing a highly hygroscopic food sample for moisture via gravimetric methods, the analyst must demonstrate competency by:
(A) Cooling the dried sample on the open laboratory bench to dissipate heat
(B) Adding excess water to the sample prior to placing it inside the oven
(C) Using a desiccator with active desiccant during cooling before weighing
(D) Weighing the sample while it is still hot to prevent water reabsorption

71. In intermediate moisture foods like jams, the risk of microbial spoilage is tied to water activity. If a jam sample yields an a_w of 0.85, a case analysis

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would conclude that it is susceptible to which primary spoilage organisms?
(A) Most Gram-negative bacteria like Salmonella
(B) Clostridium botulinum
(C) Only extreme halophilic archaea
(D) Osmophilic yeasts and xerophilic molds

72. Identify the correct pair regarding components of the Karl Fischer reagent:
(A) Iodine (I_2) – Acts as the primary oxidizing agent
(B) Sulfur dioxide (SO_2) – Serves as the solvent matrix
(C) Methanol – Functions as the basic buffer
(D) Pyridine – Reduces the water molecules to hydrogen gas

73. The standard reference temperature typically used for determining total ash in most food products via dry ashing in a muffle furnace is:
(A) 105°C
(B) 550°C
(C) 250°C
(D) 900°C

74. Which of the following is NOT a recognized method for determining water activity or moisture content?
(A) Chilled mirror dew point technique
(B) Hydrometry using a lactometer
(C) Near-infrared (NIR) spectroscopy
(D) Halogen moisture analyzer

75. Identify the incorrect pair regarding defects or issues during ashing:
(A) Desiccation – Inorganic salt formation increasing final ash weight
(B) Incomplete combustion – Presence of black carbon specks in the final ash
(C) Volatilization loss – Volatilization of metals like Lead at high heat
(D) Spattering – Sample loss caused by excessively rapid initial heating

76. The Dumas combustion method for protein determination fundamentally relies on:
(A) Digesting the sample in concentrated acid to yield ammonia gas
(B) Titrating the free amino groups directly using a strong alkali
(C) Combusting the sample over 900°C to yield elemental nitrogen gas
(D) Measuring the absorbance of peptide bonds at 280 nm wavelength

77. Consider the following statements regarding the Kjeldahl method:
I. Digestion utilizes concentrated sulfuric acid to break down organic matter.
II. A catalyst such as copper sulfate ($CuSO_4$) is used to accelerate the digestion process.
III. During distillation, sodium hydroxide is added to convert ammonium sulfate to ammonia gas.
IV. The liberated ammonia is collected in a solution of standardized hydrochloric acid or boric acid.
Which of the statements given above are correct?
(A) I, II and III only
(B) II, III and IV only
(C) I, III and IV only
(D) I, II, III and IV

78. Which of the following correctly describes the Soxhlet extraction method?
(A) It is a continuous, automated liquid-liquid extraction technique for proteins
(B) It relies on centrifugal force to separate lipid fractions from aqueous milk
(C) It is a semi-continuous solid-liquid method washing solid sample with solvent
(D) It employs acid hydrolysis followed by colorimetric measurement of fatty acids

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79. The standard nitrogen-to-protein conversion factor of 6.25 is based on the assumption that:
(A) Most food proteins contain exactly 6.25% nitrogen by weight
(B) Most food proteins contain approximately 16% nitrogen by weight
(C) Nitrogen makes up 6.25% of the total mass of the food product
(D) The atomic weight of nitrogen is 6.25 times lighter than carbon

80. Given below are two statements, one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): The Gerber method is widely used for routine fat determination in milk and dairy products.
Reason (R): The Gerber method uses concentrated sulfuric acid to dissolve the milk proteins, releasing the fat which is then separated by centrifugation.
(A) Both A and R are true and R is the correct

explanation of A
(B) Both A and R are true but R is not the correct explanation of A
(C) A is true but R is false
(D) A is false but R is true

81. When analyzing the protein content of a food sample using the Kjeldahl method, an analyst adds potassium sulfate (K_2SO_4) to the digestion flask. Applying chemical principles, what is the specific role of this compound?
(A) It raises sulfuric acid's boiling point to accelerate digestion
(B) It acts as a highly efficient heavy metal catalyst for reaction
(C) It buffers the mixture to prevent ammonia escape during digestion
(D) It acts as a colorimetric indicator during the titration phase

82. Consider the following statements comparing Dumas and Kjeldahl methods:
Statement I: The Dumas method is generally much faster than the classical Kjeldahl method.
Statement II: The Kjeldahl method measures both organic nitrogen and all forms of inorganic nitrogen (like nitrates/nitrites) directly without any modification.
(A) Both Statement I and Statement II are correct
(B) Both Statement I and Statement II are incorrect
(C) Statement I is correct but Statement II is incorrect
(D) Statement I is incorrect but Statement II is correct

83. Match the fat extraction techniques in List-I with their distinct characteristics in List-II.
List I: Fat Extraction Techniques
P. Soxhlet Extraction
Q. Mojonnier Method
R. Rose-Gottlieb Method
S. Babcock Method
List II: Distinct Characteristics
I. Uses ammonia, ethanol, diethyl ether, and petroleum ether for liquid-liquid extraction
II. Uses a specialized flask and concentrated sulfuric acid for dairy
III. Employs a specialized extraction flask with two chambers for multiple extractions
IV. Semi-continuous extraction using a siphon mechanism
(A) P-IV, Q-III, R-I, S-II
(B) P-IV, Q-I, R-III, S-II
(C) P-I, Q-II, R-III, S-IV
(D) P-III, Q-IV, R-I, S-II

84. Which of the following statements about acid hydrolysis prior to fat extraction is incorrect?
(A) It is primarily used to break lipid-carbohydrate and lipid-protein bonds in complex foods
(B) It is heavily utilized in baked goods and extruded foods where fat is strongly bound
(C) Hydrochloric acid (HCl) is commonly used to hydrolyze the sample before solvent extraction
(D) It results in the conversion of free fatty acids into complex triglycerides

85. During Kjeldahl digestion, excessive foaming occurs in a sample containing high levels of carbohydrates. To handle this issue competently, the analyst should:
(A) Rapidly increase the heat to boil off the foam
(B) Add an anti-foaming agent like octyl alcohol
(C) Add sodium hydroxide to neutralize the hot acid
(D) Stop the process and report sample as untestable

86. A dairy company is suspected of adulterating milk powder with melamine to artificially boost the apparent protein content. Which analytical scenario best explains why routine testing missed this adulteration?
(A) Routine testing used the Soxhlet method which co-extracts melamine with lipids
(B) Routine testing used amino acid sequencing which mistook melamine for lysine units
(C) Kjeldahl measures total nitrogen, not true protein; melamine is rich in nitrogen
(D) Melamine prevents protein digestion, making the measured nitrogen falsely low

87. Identify the correct pair regarding solvents used in crude fat extraction:
(A) Water – Primary solvent for Soxhlet extraction
(B) Acetic acid – Solvent for non-polar triglycerides
(C) Methanol – Standard solvent in the Babcock test
(D) Petroleum ether – Non-polar solvent for

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lipids

88. In the Kjeldahl distillation step, what chemical is used to collect the liberated ammonia gas when a back-titration method is NOT being used (i.e., direct titration is planned)?
(A) Dilute boric acid with indicator
(B) Concentrated sulfuric acid fluid
(C) Standard sodium hydroxide solution
(D) Aqueous potassium dichromate salts

89. Which of the following is NOT a step in the classical Kjeldahl procedure?
(A) Digestion
(B) Saponification
(C) Distillation
(D) Titration

90. Identify the incorrect pair regarding protein analysis variables:
(A) Total Nitrogen – Measured directly by Kjeldahl or Dumas
(B) True Protein – Calculated by multiplying Total Nitrogen by 100
(C) Non-Protein Nitrogen (NPN) – Nitrogen from urea, amino acids, and alkaloids
(D) Conversion Factor – E.g., 5.70 for wheat protein, 6.38 for milk protein

91. Total carbohydrate "by difference" is defined as:
(A) 100 minus the sum of moisture, protein, fat, and ash percentages
(B) Direct chemical measurement of complex polysaccharides using HPLC
(C) The difference between total dietary fibre and crude fibre levels
(D) Spectrophotometric measurement of reducing minus non-reducing sugars

92. Consider the following statements regarding the enzymatic-gravimetric method for determining dietary fibre (e.g., AOAC 985.29):
I. It employs gelatinization using heat-stable α-amylase.
II. Protease is used to depolymerize starch into glucose.
III. Amyloglucosidase is added to complete the digestion of starch.
IV. Soluble dietary fibre is precipitated using hot concentrated sulfuric acid.
Which of the statements given above are correct?
(A) I and III only
(B) I, II and III only
(C) II and IV only
(D) I, III and IV only

93. Which of the following statements correctly distinguishes crude fibre from dietary fibre?
(A) Crude fibre includes all soluble and insoluble fibres, whereas dietary fibre only includes cellulose
(B) Crude fibre is measured enzymatically, whereas dietary fibre is measured solely by acid titration
(C) There is no difference; the terms are entirely synonymous in modern AOAC regulatory guidelines
(D) Crude fibre is measured by hot acid/alkali extraction, destroying most hemicellulose and pectin

94. During a titration with 2,6-dichlorophenolindophenol (DCPIP), the blue indicator turns pink and then colorless upon reaction. This reduction is caused by the presence of:
(A) Acetic acid
(B) Free fatty acid
(C) Ascorbic acid
(D) Amino acids

95. Given below are two statements, one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): The saponification value of a fat is inversely proportional to its mean molecular weight (chain length of the fatty acids).
Reason (R): Fats containing short-chain fatty acids require more potassium hydroxide per gram to saponify than fats containing long-chain fatty acids.
(A) Both A and R are true and R is the correct explanation of A
(B) Both A and R are true but R is not the correct explanation of A
(C) A is true but R is false
(D) A is false but R is true

96. An analyst applies the Wijs method to evaluate an unknown vegetable oil. A high titration value indicates high iodine absorption. This conceptually implies that the oil:
(A) Has undergone severe hydrolytic rancidity
(B) Has high levels of saturated fatty acids
(C) Has a high average chemical molecular weight

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(D) Contains many carbon-carbon double bonds

97. Consider the following statements regarding titratable acidity:
Statement I: Titratable acidity measures the total concentration of titratable hydrogen ions (total acidity) present in a food sample.
Statement II: Titratable acidity provides exactly the same numerical value as the pH of the sample.
(A) Both Statement I and Statement II are correct
(B) Both Statement I and Statement II are incorrect
(C) Statement I is correct but Statement II is incorrect
(D) Statement I is incorrect but Statement II is correct

98. Match the titration parameters in List-I with what they primarily measure in List-II.
List I: Titration Parameters
P. Iodine Value
Q. Saponification Value
R. Peroxide Value
S. Titratable Acidity
List II: Target Measurements
I. Primary oxidative rancidity (hydroperoxides)
II. Degree of unsaturation in lipids
III. Total acid content typically expressed as a predominant organic acid
IV. Average molecular weight of fatty acids
(A) P-II, Q-IV, R-I, S-III
(B) P-IV, Q-II, R-I, S-III
(C) P-II, Q-I, R-IV, S-III
(D) P-I, Q-IV, R-II, S-III

99. Which of the following statements regarding carbohydrate analysis is incorrect?
(A) High-Performance Liquid Chromatography (HPLC) cannot be used as a direct method for analyzing individual sugars
(B) The phenol-sulfuric acid method is a colorimetric method used for total carbohydrates
(C) Lane-Eynon titration relies on the reduction of copper(II) to copper(I) by reducing sugars
(D) Sucrose is a non-reducing sugar that must be inverted (hydrolyzed) before it can be measured via copper reduction methods

100. When determining dietary fibre, a competent analyst must separate soluble from insoluble fibre. Which solvent is conventionally added to the enzymatic digest to precipitate the soluble dietary fibre?
(A) Hexane
(B) Chloroform
(C) Concentrated Hydrochloric Acid
(D) 95% Ethanol

101. A laboratory analyzes orange juice for Vitamin C content. If the sample is heavily pigmented (deep red/orange), the standard visual endpoint of the DCPIP titration may be obscured. What case-based alternative is most appropriate?
(A) Bleaching the juice with chlorine before titration
(B) Using a fluorometric or potentiometric method
(C) Boiling the orange juice to precipitate pigments
(D) Switching to a sodium hydroxide acid-base titration

102. Identify the correct pair regarding indicators used in classical food titrations:
(A) Starch – Kjeldahl indicator turning blue in acid
(B) Methyl orange – Wijs indicator in lipid solution
(C) Phenolphthalein – Acidity indicator, pink at pH ~8.2
(D) Methylene blue – Saponification indicator, turns red

103. In the classical determination of crude fibre, the sample is sequentially boiled in standard solutions of:
(A) 0.1 N Hydrochloric acid followed by 95% Ethanol
(B) Nitric acid followed by Potassium hydroxide solutions
(C) 5% Acetic acid followed by 5% Ammonia solution
(D) 1.25% Sulfuric acid and 1.25% Sodium hydroxide

104. Which of the following is NOT typically measured as a component of classical crude fibre?
(A) Soluble pectins
(B) Cellulose
(C) Lignin
(D) Hemicellulose (partial)

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105. Identify the incorrect pair regarding titration endpoints:
(A) Lane-Eynon method – Methylene blue indicator is reduced to a colorless state
(B) Peroxide Value – Phenolphthalein indicator turns from pink to colorless
(C) Karl Fischer – Presence of excess iodine detected amperometrically or visually
(D) Vitamin C (DCPIP) – Persistent pink color in an acidic medium

106. The Peroxide Value (PV) of an oil is fundamentally defined as:
(A) The milligrams of potassium hydroxide required to neutralize the free fatty acids in 1 gram of fat
(B) The milliequivalents of active oxygen (peroxides) present in 1 kilogram of fat
(C) The amount of malondialdehyde produced during lipid oxidation
(D) The percentage of moisture and volatile matter in the oil

107. Consider the following statements regarding the Thiobarbituric Acid (TBA) test:
I. It is used to measure secondary lipid oxidation products.
II. It primarily quantifies malondialdehyde (MDA).
III. The reaction yields a distinct red-pink chromogen.
IV. It is best suited for assessing the initial, invisible stages of autoxidation in fresh oils.
Which of the statements given above are correct?
(A) I and II only
(B) I, II and III only
(C) II, III and IV only
(D) I, II, III and IV

108. Which of the following statements concerning colorimetric methods for sugars is correct?
(A) The Dinitrosalicylic acid (DNS) method measures non-reducing sugars exclusively in plant extracts
(B) Colorimetric methods for sugars typically read sample absorbance in the ultraviolet region (under 300 nm)
(C) The phenol-sulfuric acid method dehydrates carbohydrates to furfural, producing a yellow color with phenol
(D) Enzymatic colorimetric assays like GOX (glucose oxidase) cannot differentiate between glucose and fructose

109. An increase in the Free Fatty Acid (FFA) content of a deep-frying oil indicates that the oil has undergone:
(A) Polymerization
(B) Hydrogenation
(C) Halogenation
(D) Hydrolytic rancidity

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110. Given below are two statements, one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): A food product may have a low pH but a high buffering capacity.
Reason (R): Buffering capacity depends on the concentration of weak acids and their conjugate bases in the food matrix, which resist changes in pH upon the addition of strong acids or alkalis.
(A) Both A and R are true and R is the correct explanation of A
(B) Both A and R are true but R is not the correct explanation of A
(C) A is true but R is false
(D) A is false but R is true

111. In a legal dispute over the adulteration of mustard oil, the FSO must select an analytical protocol. Applying the principles of standard methods in India, which organization's manual provides the primary, legally binding analytical protocols under the Food Safety and Standards Act?
(A) ISO (International Organization for Standardization)
(B) FSSAI Manual of Methods of Analysis
(C) Codex Alimentarius
(D) AOAC International (independent of FSSAI endorsement)

112. Consider the following statements regarding the determination of phenols in food:
Statement I: The Folin-Ciocalteu method is widely used for the colorimetric determination of total phenolic content.
Statement II: The Folin-Ciocalteu reagent specifically reacts with phenols to produce a distinct red complex that is measured at 450 nm.
(A) Both Statement I and Statement II are correct
(B) Both Statement I and Statement II are incorrect
(C) Statement I is correct but Statement II is incorrect
(D) Statement I is incorrect but Statement II is

correct

113. Match the standard setting organizations in List-I with their primary domain or characteristic in List-II.
List I: Standard Setting Organizations
P. AOAC International
Q. BIS
R. ISO
S. Codex Alimentarius
List II: Primary Domains
I. International food standards developed by FAO/WHO
II. Indian national standards body providing IS codes
III. Global federation of national standard bodies defining general laboratory quality (e.g., 17025)
IV. Publishes globally recognized Official Methods of Analysis, historically focused on agricultural chemistry
(A) P-IV, Q-II, R-III, S-I
(B) P-IV, Q-I, R-II, S-III
(C) P-II, Q-III, R-IV, S-I
(D) P-III, Q-IV, R-I, S-II

114. Which of the following statements regarding pH meter calibration is incorrect?
(A) A pH meter should ideally be calibrated using at least two, preferably three, standard buffer solutions
(B) The calibration buffers should bracket the expected pH range of the food samples
(C) Temperature compensation is unnecessary because pH values are completely independent of temperature
(D) The electrode must be rinsed with distilled or deionized water between buffer measurements to prevent cross-contamination

115. Sample tests on stored peanut oil reveal a very low Peroxide Value (PV) but a very high TBA value and a distinct rancid odor. The competent interpretation of this result is:
(A) Primary peroxides broke down into secondary aldehydes, indicating advanced oxidation
(B) The oil sample is entirely fresh, and the identified rancid odor is purely natural
(C) The oil has undergone hydrolytic rancidity reactions rather than oxidative rancidity
(D) The analytical reagents for PV were defective, because PV must be high when TBA is high

116. When utilizing a colorimetric assay to measure starch content, iodine is commonly added. In this case, amylose reacts with iodine to form a complex of what color?
(A) Brick red
(B) Bright yellow
(C) Pale green
(D) Deep blue-black

117. Identify the correct pair regarding lipid oxidation parameters and their target analytes:
(A) Free Fatty Acids (FFA) – Measures aldehyde concentration
(B) Peroxide Value (PV) – Measures hydroperoxides
(C) Thiobarbituric Acid (TBA) – Measures free radical initiation
(D) Iodine Value – Measures primary oxidation

118. In the classical titration method for Peroxide Value determination, what chemical is titrated against the liberated iodine?
(A) Standardized sodium hydroxide
(B) Standardized hydrochloric acid
(C) Standardized sodium thiosulfate
(D) Standardized potassium permanganate

119. Which of the following is NOT generally recognized as a body providing standard reference analytical methods for food?
(A) AOAC
(B) BIS
(C) AACC (American Association of Cereal Chemists)
(D) OSHA (Occupational Safety and Health Administration)

120. Identify the incorrect pair regarding colorimetric reagents and their targets:
(A) Biuret reagent – Complex carbohydrates
(B) DNS (3,5-dinitrosalicylic acid) – Reducing sugars
(C) Folin-Ciocalteu – Total phenolic compounds
(D) Ninhydrin – Free amino acids

121. The term "aliquot" in laboratory sampling refers to:
(A) The total starting mass of the collected field sample
(B) A known fractional portion of a sample used for analysis
(C) The discarded portion of a manually quartered sample heap

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(D) The unique legal identification barcode on a sample jar

122. Consider the following statements regarding the physical tools used in sample preparation:
I. A mortar and pestle are primarily used for liquid-liquid extraction.
II. A Waring blender is effective for homogenizing soft or semi-solid foods.
III. A ball mill is useful for grinding dry, hard materials to a fine powder.
IV. A riffler is a mechanical device used to objectively divide granular solid samples.
Which of the statements given above are correct?
(A) I, II and III only
(B) II, III and IV only
(C) I and IV only
(D) I, II, III and IV

123. Which of the following statements correctly defines the "producer's risk" in an acceptance sampling plan?
(A) The probability of rejecting a lot that is actually of acceptable quality
(B) The probability of accepting a lot that exceeds the maximum defect threshold
(C) The financial penalty incurred by the manufacturer due to product recall
(D) The risk of microbiological spoilage during transport

124. When extracting fat using a highly volatile solvent like diethyl ether, the extraction thimble is placed inside a Soxhlet apparatus. If ambient temperature in the lab exceeds the boiling point of the solvent, the primary effect will be:
(A) Complete heat-induced destruction of sample fatty acids
(B) Direct thermal saponification of the fat triglycerides
(C) Excessive solvent evaporation causing dry-boil hazards
(D) Rapid chemical conversion of organic solvent into water

125. Given below are two statements, one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): In the determination of crude protein, samples containing high nitrate levels often require a modification to the standard Kjeldahl method (e.g., using salicylic acid).
Reason (R): The standard Kjeldahl digestion does not quantitatively reduce and capture nitrates and nitrites as ammonium sulfate.
(A) Both A and R are true and R is the correct explanation of A
(B) Both A and R are true but R is not the correct explanation of A
(C) A is true but R is false
(D) A is false but R is true

126. A 5kg batch of grain is to be tested for aflatoxins. Because aflatoxins are known to occur in highly localized "hotspots", which sampling approach conceptually provides the highest probability of detection?
(A) Taking a single 500g sample from the center of the batch
(B) Selecting only the grains that appear visually unblemished
(C) Taking multiple small incremental samples to form a composite sample
(D) Testing the dust collected at the bottom of the container

127. Consider the following statements regarding sample digestion for heavy metal analysis:
Statement I: Wet ashing using a mixture of nitric and perchloric acids completely destroys the organic matrix without volatilizing most trace metals.
Statement II: Perchloric acid digestions are inherently safe and can be performed on an open laboratory benchtop without a specialized fume hood.
(A) Both Statement I and Statement II are correct
(B) Both Statement I and Statement II are incorrect
(C) Statement I is correct but Statement II is incorrect
(D) Statement I is incorrect but Statement II is correct

128. Match the lipid indices in List-I with the corresponding chemical formulas/equations conceptually associated with them in List-II.
List I: Lipid Indices
P. Acid Value
Q. Saponification Value
R. Iodine Value
S. Peroxide Value
List II: Chemical Expressions
I. mg KOH / g fat (neutralization of FFA)
II. mg KOH / g fat (hydrolysis of all ester

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bonds)
III. g I_2 absorbed / 100 g fat
IV. meq O_2 / kg fat
(A) P-I, Q-II, R-III, S-IV
(B) P-II, Q-I, R-IV, S-III
(C) P-I, Q-III, R-II, S-IV
(D) P-III, Q-II, R-IV, S-I

129. Which of the following statements about classical moisture determination is incorrect?
(A) Bound water is easily removed by drying in a hot air oven at 100°C for 2 hours
(B) Free water is the primary target of standard evaporative drying methods
(C) Volatile flavor compounds may be lost during oven drying, causing an overestimation of moisture
(D) The Dean-Stark method prevents the loss of heat-labile components by co-distilling water at a lower temperature with a solvent

130. To demonstrate competency in volumetric analysis (titration), an analyst standardizes a 0.1 N Sodium Hydroxide solution before using it to test titratable acidity. The primary standard typically used for this calibration is:
(A) Hydrochloric acid solution (HCl)
(B) Pure sodium chloride crystals (NaCl)
(C) Potassium hydrogen phthalate (KHP)
(D) Pure standard ascorbic acid powder

131. A laboratory performs a crude fibre analysis on a bran sample. After sequential acid and alkali boiling, the residue is dried, weighed, and then ignited in a muffle furnace. The loss in weight during this final ignition represents:
(A) Crude fibre
(B) Total moisture
(C) Crude fat
(D) Total ash

132. Identify the correct pair regarding elements quantified by specific standard methods:
(A) Carbon – Gerber method
(B) Sulfur – Soxhlet method
(C) Oxygen – Folin-Ciocalteu method
(D) Nitrogen – Kjeldahl method

133. When performing a sensory and chemical evaluation of milk, what test determines the natural buffering capacity and the extent of developed lactic acid?
(A) Standard iodine value titration
(B) Titratable acidity (% lactic acid)
(C) Babcock centrifugation fat test
(D) Methylene blue reduction test

134. Which of the following is NOT an advantage of instrumental methods (like NIR spectroscopy) over classical analysis methods?
(A) Faster analysis time
(B) Non-destructive nature
(C) Ability to run without any prior calibration against classical reference methods
(D) Simultaneous determination of multiple parameters (e.g., protein, fat, moisture)

135. Identify the incorrect pair regarding common analytical equivalents:
(A) Crude Protein – Nitrogen × 6.25 (standard)
(B) Titratable Acidity in wine – Expressed as tartaric acid
(C) Crude Fat – Ether extract
(D) Total Carbohydrates – Measured directly by Kjeldahl

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136. The buffering capacity of a food is primarily governed by the presence of:
(A) Weak acids and their salts
(B) Strong acids and strong bases
(C) Total distilled water content
(D) Total lipid concentration

137. Consider the following statements regarding standard methods:
I. AOAC methods undergo rigorous collaborative multi-laboratory validation before being termed "Official Methods".
II. Using an unvalidated in-house method for legal food safety enforcement is legally sound.
III. BIS standards provide precise limits for specific chemical parameters in Indian food products.
IV. Method validation includes determining limits of detection (LOD) and limits of quantification (LOQ).
Which of the statements given above are correct?
(A) I, II and III only
(B) I, III and IV only
(C) II, III and IV only
(D) I and IV only

138. Which of the following statements correctly defines the Limit of Detection (LOD) in analytical chemistry?

(A) Lowest concentration quantified with acceptable precision and accuracy
(B) Lowest analyte concentration that can be detected but not quantified
(C) Maximum concentration of a chemical substance permitted under the law
(D) The absolute zero intercept point plotted on a calibration curve

139. High temperatures during standard sample grinding in a mechanical mill can cause localized heating. A direct chemical effect of this heating is:
(A) Moisture loss and vitamin thermal degradation
(B) Immediate volatilization of heavy toxic metals
(C) Chemical synthesis of new essential amino acids
(D) Physical transformation of cellulose into starch

140. Given below are two statements, one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Wet ashing is preferred over dry ashing for the preparation of samples destined for trace mineral analysis like Arsenic and Mercury.
Reason (R): Wet ashing operates at much lower temperatures than a muffle furnace, thereby preventing the volatilization of these elements.
(A) Both A and R are true and R is the correct explanation of A
(B) Both A and R are true but R is not the correct explanation of A
(C) A is true but R is false
(D) A is false but R is true

141. An analytical chemist is trying to establish a standard curve for reducing sugars using a spectrophotometer. Applying Beer-Lambert's law, the relationship between absorbance and the concentration of the sugar complex should be:
(A) Exponential across all concentration values tested
(B) Inversely proportional to standard concentration
(C) Completely independent of cuvette light path length
(D) Directly proportional and linear in a specific range

142. Consider the following statements regarding the handling of food matrices:
Statement I: Semi-solid foods like butter should be warmed gently to a liquid state and stirred continuously to obtain a homogeneous sub-sample.
Statement II: Frozen foods must be completely thawed at room temperature for several days before sampling to ensure accurate microbiological testing.
(A) Both Statement I and Statement II are correct
(B) Both Statement I and Statement II are incorrect
(C) Statement I is correct but Statement II is incorrect
(D) Statement I is incorrect but Statement II is correct

143. Match the specific laboratory instruments in List-I with their primary operational procedures in List-II.
List I: Laboratory Instruments
P. Refractometer
Q. Spectrophotometer
R. pH Meter
S. Muffle Furnace
List II: Primary Operational Procedures
I. Measures the voltage difference between a glass electrode and a reference electrode
II. Measures the angle of light bending through a liquid sample to determine soluble solids (Brix)
III. Heats samples to 550°C for organic material combustion
IV. Measures the transmission or absorption of light at specific wavelengths
(A) P-II, Q-IV, R-I, S-III
(B) P-IV, Q-II, R-I, S-III
(C) P-II, Q-I, R-4, S-III
(D) P-I, Q-IV, R-II, S-III

144. Which of the following statements regarding the documentation of field samples by an FSO is incorrect?
(A) The documentation must clearly state the physical condition of the sample at the time of seizure
(B) Form VA must be provided to the food business operator acknowledging the seizure
(C) Witnesses to the sampling process must sign the relevant seizure documentation
(D) Digital evidence (like photographs) of the

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sampling process is strictly prohibited under FSSAI rules

145. A technician is conducting a Kjeldahl analysis. During the distillation phase, the solution inside the receiving flask unexpectedly changes color indicating that the boric acid buffer has been exhausted. To competently resolve this issue in future runs, the technician should:
(A) Increase the volume or concentration of the boric acid receiving solution
(B) Decrease the amount of sodium hydroxide added during distillation
(C) Skip the digestion step altogether
(D) Use a smaller volume of the food sample while keeping the same acid concentration

146. A dispute arises over the true protein content of a soy product, with one lab claiming 40% and another 35%. A review reveals Lab A used a conversion factor of 6.25, while Lab B used 5.71 (the specific factor for soy). Which statement is analytically correct?
(A) Lab A is correct because 6.25 is the universal constant for all proteins
(B) Both labs are incorrect because protein must be determined via chromatography
(C) Lab B is more accurate because specific proteins have distinct nitrogen ratios
(D) Nitrogen conversion factors have no impact on the final protein percentage

147. Identify the correct pair regarding components of an official food safety report:
(A) Analytical results – Numerical findings compared to limits
(B) Date of receipt – The date the food was first manufactured
(C) Reference method – Technique favored by the individual analyst
(D) FSO Code – The barcode assigned randomly by the retail vendor

148. Which parameter is derived directly from the difference between the weight of a wet sample and its weight after heating in a hot air oven to a constant weight?
(A) Specific gravity
(B) Refractive index
(C) Ash content
(D) Moisture content

149. Which of the following elements is NOT routinely quantified using standard Kjeldahl or Dumas combustion methods?
(A) Total Nitrogen
(B) Calcium
(C) Apparent Protein
(D) Non-Protein Nitrogen (by calculation/ fractionation)

150. Identify the incorrect pair regarding standard methods of classical food analysis:
(A) Volumetry – Determination of concentration by measuring the volume of a standard reagent required to react completely with the analyte
(B) Gravimetry – Determination of concentration by isolating and weighing a specific element or compound
(C) Colorimetry – Measuring the mass of an element by burning it into a solid ash
(D) Chromatography – Separating components of a mixture based on varying affinities to stationary and mobile phases

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ANSWERS

1. (A) A quantity of food produced under uniform conditions
A lot represents a distinct quantity of food manufactured, processed, or packaged under virtually identical parameters, ensuring uniform characteristics throughout. Defining a lot is crucial in food sampling because statistical assumptions about homogeneity and distribution are based on this uniformity. It forms the primary population unit from which representative samples are systematically drawn.

2. (B) I and III only
Simple random sampling requires that every individual element of a food population has an equal, independent probability of selection, typically achieved through random number tables. While highly objective, it does not eliminate sampling error or statistical variance. It is also unsuitable for unsorted bulk materials like deep silos without prior division.

3. (A) The difference between the sample estimate and the true population value
Sampling error represents the inevitable discrepancy between the estimated value obtained from a sample and the true value of the entire food population. It arises naturally because a sample represents only a portion of the whole. This error is distinct from analytical mistakes made by technicians or systematic instrumental calibration drift.

4. (D) It divides the population into homogeneous subgroups to reduce sampling variance
Stratified sampling is highly effective for heterogeneous food lots because it involves categorizing the diverse population into distinct, homogeneous subgroups called strata. By sampling independently from each stratum, analysts ensure that all sub-populations are proportionally represented. This statistical approach significantly minimizes the overall sampling variance compared to simple random selection methods.

5. (C) A is true but R is false
Composite sampling involves physically blending multiple individual sample units to create a single representative mixture for laboratory analysis. While this approach effectively determines the average quality of a large batch while reducing analytical costs, it dilutes localized variations. Consequently, it cannot isolate or identify highly localized hotspots of microbiological or chemical contamination.

6. (C) Systematic sampling by taking a sample every 30 minutes
Systematic sampling involves drawing samples at predetermined, uniform intervals, such as every thirty minutes, throughout a continuous production shift. This approach ensures comprehensive temporal representation across the entire processing period. It eliminates personal bias while capturing operational fluctuations, making it far more representative than selecting arbitrary times or focusing only on visually non-conforming items.

7. (C) Statement I is correct but Statement II is incorrect
A composite sample significantly lowers laboratory expenses and testing times by allowing a single chemical analysis to estimate the overall average quality of a food lot. However, it is highly ineffective for detecting trace volatile chemical contaminants or localized adulterants. The physical blending process dilutes and potentially evaporates these specific components below detectable limits.

8. (A) P-II, Q-I, R-IV, S-III
Food sampling methodologies must match specific logistical and statistical requirements. Dividing a lot into zones before drawing samples represents stratified sampling, while choosing items at fixed regular intervals defines systematic sampling. Convenience sampling relies entirely on picking easily accessible units, whereas simple random sampling ensures that every single unit has an equal probability of selection.

9. (B) An increase in sample size uniformly increases both the producer's risk and the consumer's risk
A standard sampling plan establishes sample sizes and the mathematical criteria required for accepting or rejecting a food lot. Increasing the sample size enhances statistical confidence

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and reduces risks for both parties. It lowers the producer's risk of having compliant lots rejected and reduces the consumer's risk of accepting sub-standard or contaminated shipments.

10. (B) Using m, M, and c values to classify the overall lot quality
Microbiological safety evaluations often utilize three-class attributes plans, which categorize analytical results into three distinct quality levels. These plans rely on specific parameters, where lower-case m represents the acceptable threshold, upper-case M represents the hazardous limit, and c is the maximum allowable number of samples falling between these two numerical values.

11. (A) II, IV, I, III
A systematic food analysis workflow begins with the collection of primary field samples from the target lot. These individual units are subsequently combined to form a composite sample representing the average quality. This composite is thoroughly homogenized in the laboratory to ensure uniform distribution, and finally divided into analytical test portions for testing.

12. (C) Sterile scalpel – Solid meat cuts
Selecting the correct sampling tool is essential to prevent contamination and preserve sample integrity. A sterile scalpel is the standard implement for cutting and extracting representative portions of solid meat matrices. Conversely, triers are used for dry powders rather than liquids, dippers are for liquids, and thief probes target free-flowing granular solids.

13. (D) The maximum percent defective considered satisfactory as a process average
The acceptable quality level represents the maximum percentage of non-conforming or defective units in a food lot that is considered satisfactory as a long-term process average. It is a critical parameter in acceptance sampling plans that helps balance quality assurance with production realities, rather than demanding an absolute zero-defect standard for every batch.

14. (C) Judgmental sampling
Probabilistic sampling methods rely on mathematical probability to ensure every unit has a known, non-zero chance of selection. Simple random, systematic, and cluster sampling fall into this scientific category. Judgmental sampling is non-probabilistic, relying on the subjective decision of an inspector to choose specific items, which introduces bias and invalidates standard statistical inferences.

15. (B) Consumer's Risk (β) – The probability of rejecting a good lot
In statistical quality control, consumer risk, represented by the Greek letter beta, is the probability of accepting a bad or non-conforming lot. Conversely, the probability of rejecting a high-quality or compliant lot is termed producer risk, represented by alpha. Accurate understanding of these distinct risks is critical for designing fair, regulatory food sampling plans.

16. (D) A curve plotting acceptance probability against the actual lot defect rate
The operating characteristic curve is a fundamental statistical tool that plots the probability of accepting a food lot against its actual defect rate. This curve visually illustrates the performance, stringency, and discriminating power of a specific sampling plan, helping quality managers and regulators understand the risks of accepting substandard batches or rejecting compliant ones.

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17. (A) I and II only
Sampling liquid foods requires careful preparation to ensure representation. Bulk liquids stored in large tanks must be thoroughly agitated prior to sampling to eliminate stratification caused by settling. For continuous production lines, flowing liquid streams must be sampled systematically at set time intervals, regardless of whether the target analysis is chemical or microbiological.

18. (C) Two-class plans classify lots as acceptable/defective, while three-class plans add a marginal category
Two-class attribute sampling plans evaluate lots on a simple binary pass-or-fail basis, classifying each sample unit as either acceptable or defective. In contrast, three-class plans introduce a third marginal category. This allows for some toleration of minor non-conformances between two set limits, accommodating natural microbiological variations without automatically rejecting the entire product lot.

19. (A) An increase in the producer's risk (α) because good lots are more likely to be rejected
Decreasing the acceptance number in a sampling plan increases the stringency of the criteria, which directly escalates the producer risk. With a lower

threshold for acceptable defectives, high-quality food lots are much more likely to be rejected due to minor, random variations. Consequently, the probability of rejecting a compliant batch increases substantially.

20. (D) A is false but R is true
Perishable semi-solid food samples must be handled carefully during transport to prevent microbial proliferation and enzymatic degradation. However, freezing using liquid nitrogen is not universally applied to all samples because extreme freezing can cause physical or chemical alterations, such as emulsion breakage or cell lysis, which can invalidate certain specific chemical or microbiological analyses.

21. (B) A slotted trier
Drawing a representative core sample of dry, powdery materials like flour from a deep woven sack is best achieved using a slotted trier. This specialized tool easily penetrates the grain bag, allowing flour from different depths to flow into the slot. This ensures a highly representative vertical sample without altering the surrounding grain structure.

22. (C) Statement I is correct but Statement II is incorrect
In a perfectly normal, symmetrical distribution of analytical data, the mean, median, and mode are identical and aligned. However, if the dataset is heavily skewed to the right due to high-value contamination outliers, the arithmetic mean is pulled upward, making it numerically higher than the median. This makes the median a more robust measure.

23. (A) P-IV, Q-I, R-II, S-III
Match the field sampling techniques to their specific targets. Aseptic sampling is essential for the microbiological analysis of fresh milk to avoid external contamination. Core sampling is used to extract interior portions of solid blocks of cheese. Continuous drip sampling represents flowing liquids in pipes, while zonal sampling assesses physical stratification inside deep storage tanks.

24. (A) It is an advanced instrumental technique requiring an electronic rotary divider
Coning and quartering is a traditional, manual method of sample reduction rather than an advanced instrumental technique. It is highly effective for reducing the size of dry, granular, or powdered bulk samples. The process involves piling the material into a cone, flattening it, dividing it into four quarters, and discarding opposite quarters systematically.

25. (B) Using a mechanical riffler to divide the sample into unbiased analytical portions
Using a mechanical riffler is a critical laboratory competency when reducing a large, heterogeneous field sample of nuts into a smaller analytical portion. This device mechanically splits the dry sample into equal, unbiased fractions. It avoids manual selection bias and minimizes moisture loss, which would occur during prolonged manual grinding or thermal softening.

26. (A) II, I, IV, III
To calculate a ninety-five percent confidence interval for a sample mean, an analyst must follow a precise sequence. First, the sample mean is determined, followed by the calculation of the standard deviation. Next, the standard error of the mean is calculated. Finally, this standard error is multiplied by the critical value.

27. (A) m – The limit separating acceptable from marginally acceptable quality
In a three-class attributes sampling plan, the lower limit, designated as lower-case m, separates acceptable food units from those of marginally acceptable quality. The upper limit, designated as upper-case M, represents the threshold for unacceptable or hazardous quality. The parameter c is the maximum number of samples allowed to fall within this marginal range.

28. (C) 0.05 or 5%
The significance level, represented by the Greek letter alpha, is conventionally set at five percent in statistical hypothesis testing. This threshold represents the probability of committing a Type I error, which is the risk of rejecting a true null hypothesis. In food safety, this corresponds to declaring a compliant product batch as adulterated.

29. (D) P-value
Analytical precision indicates the closeness of agreement between repeated measurements of the same analyte. It is commonly expressed using parameters like standard deviation, coefficient of variation, and relative standard deviation. The p-value, however, is a probability used in hypothesis

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testing to determine statistical significance, and is not a direct measure of precision.

30. (C) Variance – The square root of the standard deviation
The statistical parameters used in food analysis must be correctly defined. Variance is a measure of data dispersion, defined as the square of the standard deviation, rather than its square root. Conversely, the mean represents the average, the null hypothesis assumes no difference exists, and degrees of freedom generally equal sample size minus one.

31. (B) The chronological documentation recording the sequence of custody, transfer, and analysis
The chain of custody represents the continuous, chronological documentation that records the complete sequence of possession, custody, transfer, and analysis of a legal sample. It is an essential legal protocol that tracks who held the sample at any given moment, proving that the sample tested in the laboratory is identical to the one collected.

32. (A) I and II only
Legal food samples require strict security measures to ensure integrity. A broken tamper-evident seal immediately invalidates a regulatory sample because it indicates potential unauthorized access or tampering. Additionally, using unique alphanumeric barcodes for digital tracking is highly recommended over hand-written paper notes, which are prone to damage, degradation, or transcription errors.

33. (A) They are kept under specified storage conditions for potential re-analysis or review
Under official regulatory protocols, reserve samples are securely stored under specified environmental conditions for potential re-analysis, dispute resolution, or judicial review. These samples must remain sealed and separate from the primary testing portion. They cannot be discarded immediately after a routine screening passes, nor are they routinely sent to the food business operator.

34. (C) It ensures the legal admissibility of the analytical results in a court of law
Maintaining an unbroken chain of custody is paramount because it ensures the legal admissibility of analytical findings in a court of law. It provides documented proof that the sample was secured from contamination, tampering, or misidentification throughout transit and storage, satisfying legal standards of evidence required for enforcement actions or prosecutions.

35. (A) Both A and R are true and R is the correct explanation of A
In statistical hypothesis testing, a Type I error occurs when an analyst incorrectly rejects a true null hypothesis. In the context of regulatory food enforcement, this statistical error translates to declaring a compliant, safe food batch as adulterated or contaminated. This highlights the critical importance of selecting highly accurate, validated testing methodologies.

36. (D) Reject the sample because the compromised chain of custody voids the legal evidence
Under strict chain of custody and evidentiary principles, a regulatory sample must be rejected if its matching documentation is lost during transit. Even if the physical container remains sealed, the absence of verification paperwork breaks the continuous tracking record. This makes the sample legally invalid and inadmissible for any regulatory or enforcement testing.

37. (A) Both Statement I and Statement II are correct
A Type II error occurs when an analyst fails to reject a false null hypothesis. In food safety enforcement, this means a hazardous, adulterated, or contaminated food lot is incorrectly accepted as safe and compliant. This error poses a direct threat to public health, as non-conforming products are allowed to enter the consumer market.

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38. (A) P-II, Q-III, R-IV, S-I
Statutory food sampling relies on distinct components to ensure legal and operational integrity. A physical tamper-evident seal prevents undetected access to the sample, while digital Laboratory Information Management System identifiers track the sample within the facility. Statutory forms record official seizure details, and the authorized officer's signature establishes official legal accountability.

39. (D) Pencil is preferred for writing labels as ink runs when exposed to moisture
Official sample labels must be highly durable, legible, and securely attached to prevent loss during storage. They must document critical details, including collection times, dates, exact locations, and any added chemical preservatives.

Writing labels with a pencil is inappropriate, as graphite smudges easily. Instead, water-resistant, permanent ink must be used for labeling.

40. (A) Quarantine the sample and notify supervisors to resolve the discrepancy
When a discrepancy is discovered between the sample code on a container and its accompanying tracking form, the analyst must quarantine the sample and immediately notify supervisors. Altering records or physical labels manually to bypass the issue is a serious breach of protocol that invalidates the chain of custody and compromises the analysis.

41. (A) IV, III, I, II
Securing a statutory food sample requires a strict sequence of actions to ensure legal compliance. The process begins with issuing the appropriate official notice to the food business operator. The representative sample is then divided into the required parts, packed and wrapped securely, and finally sealed and signed by witnesses and the officer.

42. (B) Microbiological samples (chilled) – Transported between 0°C to 4°C
Maintaining the correct temperature during sample transit is essential to preserve biological and chemical integrity. Chilled food samples destined for microbiological testing must be transported strictly between zero and four degrees Celsius. This temperature range prevents the rapid multiplication of mesophilic bacteria, ensuring that the microbial load remains representative of the collection point.

43. (A) The probability of observing the results assuming the null hypothesis is true
In statistical hypothesis testing, the p-value represents the probability of obtaining analytical results at least as extreme as those observed, assuming that the null hypothesis is true. It is a critical mathematical tool used to determine statistical significance, helping analysts decide whether to reject or fail to reject the null hypothesis.

44. (C) Nutritional profile of the item claimed by the manufacturer
Official tracking forms for statutory food samples require critical legal and operational information. This includes the retail vendor's full name and business address, the unique sample identification code, and the exact date and time of collection. However, the manufacturer's claimed nutritional profile is not a required field on a standard sample tracking form.

45. (D) Digestion – Synthesizing new complex molecules for easier detection
Sample preparation relies on distinct chemical and physical techniques to prepare matrices for testing. Digestion is an analytical process that uses strong acids and heat to break down complex organic matter, simplifying it for mineral analysis. It does not synthesize new complex molecules, which would complicate rather than assist the detection of target analytes.

46. (C) Partitioning of analytes between a liquid mobile phase and a solid phase
Solid-phase extraction is a widely used sample preparation technique that separates analytes from a complex matrix. The process relies on partitioning targeted chemical compounds between a liquid mobile phase and a solid stationary phase. This selective retention allows interfering substances to be washed away before the purified analyte is eluted for analysis.

47. (B) II and III only
The storage and transport of analytical samples require specific preservation techniques. Adding formalin to raw milk samples stabilizes the matrix, preventing spoilage prior to chemical testing. Additionally, samples intended for lipid analysis must be protected from exposure to light and oxygen to prevent autoxidation, which would degrade the target fatty acids and distort results.

48. (D) It uses strong acids and heat to destroy organic matter for mineral analysis
Acid digestion is a severe sample preparation method that utilizes strong, oxidizing mineral acids and heat to destroy the organic components of a food matrix. This process completely liberates inorganic minerals, preparing the sample for elemental analysis. It does not extract intact dietary fibers, capture volatile flavor compounds, or rely on gentle enzymatic degradation.

49. (A) It allows rapid mesophilic bacterial growth, distorting the original load
Transporting chilled food samples at ambient temperatures is unacceptable because it permits rapid mesophilic bacterial growth. This uncontrolled proliferation distorts the

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original microbial load of the sample, rendering subsequent laboratory analyses inaccurate. It fails to preserve the initial biological state of the product, invalidating the sample for regulatory safety assessments.

50. (A) Both A and R are true and R is the correct explanation of A
The QuEChERS method is a highly effective, modern approach to sample preparation in pesticide residue analysis. Its name reflects its design: quick, easy, cheap, effective, rugged, and safe. The procedure begins with a single-phase extraction using acetonitrile, followed by clean-up using dispersive solid-phase extraction to remove interfering matrix elements like lipids or pigments.

51. (A) Wet ashing via microwave-assisted acid digestion
Preparing leafy vegetable samples for toxic heavy metal analysis via atomic absorption spectroscopy requires wet ashing. This method utilizes microwave-assisted acid digestion to completely oxidize and destroy the organic plant matrix. This process keeps volatile heavy metals like lead and cadmium in solution, preventing the volatilization losses that can occur during dry ashing.

52. (C) Statement I is correct but Statement II is incorrect
Solvent extraction relies on the thermodynamic principle that solute solubility is maximized in solvents with similar chemical polarities. Consequently, non-polar organic solvents are highly effective for extracting non-polar lipids from food samples. Hexane is a strongly non-polar solvent, making it unsuitable for extracting highly polar, water-soluble vitamins from aqueous matrices.

53. (A) P-III, Q-IV, R-II, S-I
Clean-up techniques rely on distinct separation mechanisms to purify extracts. Gel permeation chromatography separates molecules based on physical size using porous beads, while liquid-liquid extraction partitions analytes between two immiscible liquid phases. Solid-phase microextraction uses specialized fibers to adsorb volatile analytes, and derivatization chemically modifies substances to improve volatility or detection.

54. (C) It requires the use of two miscible liquids to facilitate rapid analyte transfer
Liquid-liquid extraction involves partitioning a target analyte between two immiscible liquid phases, typically water and an organic solvent. Using two miscible liquids would prevent the formation of distinct layers, making it impossible to separate the phases. This technique typically uses a separatory funnel, though emulsion formation can sometimes interfere with phase separation.

55. (D) Breaking protein-lipid and carbohydrate-lipid bonds for complete fat release
Performing acid hydrolysis before solvent extraction is essential when analyzing crude fat in complex matrices like milk powder. This chemical pre-treatment effectively breaks covalent and non-covalent protein-lipid and carbohydrate-lipid bonds, liberating entrapped fats. Without this step, bound lipids would remain unextracted by organic solvents, leading to a significant underestimation of total fat.

56. (A) Induce phase separation between the aqueous and organic phases
The initial extraction step of the QuEChERS method involves adding buffering salts, such as magnesium sulfate and sodium chloride, to the mixture of sample and acetonitrile. These salts increase the ionic strength of the aqueous phase, promoting phase separation between water and acetonitrile. This salting-out effect ensures the efficient partition of pesticides.

57. (B) Nitric acid (HNO_3) – Used widely as a strong oxidizing acid in wet ashing
Nitric acid is a highly effective, strong oxidizing agent widely used in wet ashing procedures. It breaks down complex organic food matrices into carbon dioxide and water while keeping inorganic mineral analytes in solution. This prepares the sample for elemental testing while preventing the volatilization losses associated with high-temperature muffle furnace treatments.

58. (B) Nitric acid to lower pH below 2
Preserving water samples collected for heavy metal analysis requires the immediate addition of nitric acid to lower the pH below two. This acidification prevents metal ions from adsorbing onto the container walls or precipitating out of solution. It ensures that trace metals remain fully

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dissolved and stable during transit and storage before analysis.

59. (A) Kjeldahl distillation
Sample clean-up techniques remove interfering matrix components from food extracts before analytical testing. Valid methods include solid-phase extraction, Florisil column chromatography, and gel permeation chromatography, which isolate target analytes based on chemical or physical properties. Kjeldahl distillation is a quantitative determination technique for nitrogen and protein, not a sample clean-up method.

60. (C) Supernatant – The solid residue remaining after centrifugation
Understanding extraction terminology is essential for accurate analytical work. The supernatant is the liquid phase that remains above the compacted solid pellet after centrifugation, rather than the solid residue itself. Conversely, the analyte is the targeted chemical, the matrix is the surrounding food material, and the eluate is the solvent exiting a column.

61. (D) The ratio of water vapor pressure in food to that of pure water at equal temperature
Water activity represents the ratio of the water vapor pressure of a food product to the vapor pressure of pure water at the exact same temperature. It measures the availability of free water to participate in chemical reactions or support microbial growth, providing a more reliable indicator of food stability than total moisture content alone.

62. (A) I, II and IV only
The Karl Fischer titration is a highly specific chemical method used to determine the moisture content of various foods. The reaction involves the oxidation of sulfur dioxide by iodine in the presence of water, requiring an organic base as a buffer. It is highly sensitive, making it ideal for foods with very low moisture levels.

63. (B) Dry ashing uses high heat (550°C) without acids, while wet ashing uses liquid acids
Dry ashing and wet ashing are distinct sample preparation methods for mineral analysis. Dry ashing incinerates samples at high temperatures in a muffle furnace without acids, converting organic matter to ash. In contrast, wet ashing uses liquid oxidizing acids at lower temperatures, which is preferred for analyzing volatile trace elements that would be lost at high heat.

64. (D) Fructose decomposes thermally, losing volatile by-products alongside water
Determining the moisture content of fructose-rich foods using a standard hot air oven at one hundred and five degrees Celsius can overestimate moisture levels. High temperatures cause fructose to undergo thermal decomposition, releasing volatile organic by-products along with water vapor. This leads to a larger weight loss that is incorrectly calculated as moisture.

65. (A) Both A and R are true and R is the correct explanation of A
Vacuum ovens are preferred for moisture determination in high-sugar or heat-sensitive foods because they operate at reduced atmospheric pressure. This physical condition lowers the boiling point of water, allowing rapid evaporation at lower temperatures. This prevents thermal degradation, caramelization, or Maillard reactions that would otherwise cause inaccurate gravimetric weight measurements.

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66. (C) Dean-Stark toluene co-distillation
Determining the moisture content of essential oil-rich spices like cloves requires the Dean-Stark toluene co-distillation method. This technique heats the sample in an immiscible organic solvent, evaporating both water and volatile oils. The vapors are condensed, and the water separates into a distinct layer in a graduated trap, allowing direct volumetric measurement of moisture.

67. (A) Both Statement I and Statement II are correct
Instrumental measurement of water activity utilizes advanced physical principles. The chilled mirror dew point technique measures the exact temperature at which condensation forms on a mirror, which directly relates to the equilibrium relative humidity of the sample headspace. Capacitance sensors measure electrical changes in a polymer layer as it absorbs moisture from that headspace.

68. (A) P-III, Q-IV, R-I, S-II
Moisture and ash determination methods utilize distinct physical and chemical mechanisms. Karl Fischer titration uses a specific chemical reaction to measure trace water, while muffle furnaces operate at high temperatures for dry ashing. The Dean-Stark method co-distills water with an

immiscible solvent, and vacuum ovens use reduced pressure to dry heat-sensitive foods.

69. (B) Crucibles are put in pre-heated furnace without prior charring to speed oxidation
Dry ashing in a muffle furnace requires careful procedural steps to ensure accuracy. Placing samples directly into a pre-heated furnace without prior charring on a hot plate is incorrect, as rapid heating can cause spattering, sample loss, and incomplete combustion. Complete ashing is indicated when the residue is light gray or white.

70. (C) Using a desiccator with active desiccant during cooling before weighing
When analyzing highly hygroscopic food samples, the dried material must be cooled inside a closed desiccator containing an active chemical desiccant before final weighing. This prevents the dried sample from rapidly reabsorbing moisture from the surrounding laboratory atmosphere, which would otherwise lead to an underestimation of the calculated moisture content.

71. (D) Osmophilic yeasts and xerophilic molds
In intermediate moisture foods like jams, a water activity of zero point eight five is low enough to inhibit the growth of most bacteria, including pathogens. However, this level remains highly susceptible to spoilage by osmophilic yeasts and xerophilic molds, which are uniquely adapted to survive and proliferate in high-sugar environments with restricted water availability.

72. (A) Iodine (I_2) – Acts as the primary oxidizing agent
The Karl Fischer reagent consists of specific components that drive the chemical determination of water. Iodine acts as the primary oxidizing agent that reacts quantitatively with water in the presence of sulfur dioxide and a basic buffering agent. Methanol is commonly used as the solvent matrix to facilitate this rapid, stoichiometric reaction.

73. (B) 550°C
The standard reference temperature for determining total ash in most food products via dry ashing in a muffle furnace is five hundred and fifty degrees Celsius. This temperature is sufficient to completely combust and remove organic matter while preserving most inorganic mineral residues, preventing the thermal volatilization of major mineral components.

74. (B) Hydrometry using a lactometer
Valid methods for determining water activity or moisture content include the chilled mirror dew point technique, near-infrared spectroscopy, and halogen moisture analyzers. Hydrometry using a lactometer is not designed for this purpose; instead, it is a density-based physical measurement used to determine the specific gravity and solid content of liquid milk.

75. (A) Desiccation – Inorganic salt formation increasing final ash weight
Errors during ashing must be correctly identified. Desiccation is a cooling process that preserves dryness, not a defect that increases ash weight. Real ashing issues include incomplete combustion, which leaves black carbon specks, volatilization of metals like lead at high temperatures, and spattering, which is the physical loss of sample caused by rapid heating.

76. (C) Combusting the sample over 900°C to yield elemental nitrogen gas
The Dumas combustion method for protein determination relies on the high-temperature combustion of the food sample at over nine hundred degrees Celsius in an oxygen-rich atmosphere. This process converts all nitrogenous compounds into elemental nitrogen gas, which is subsequently measured using a thermal conductivity detector to calculate the total nitrogen and crude protein content.

77. (D) I, II, III and IV
The Kjeldahl method involves digestion, distillation, and titration steps. Digestion utilizes hot sulfuric acid and a copper sulfate catalyst to break down organic matter into ammonium sulfate. Sodium hydroxide is added to convert ammonium ions to ammonia gas, which is distilled and captured in a boric acid receiving solution before titration.

78. (C) It is a semi-continuous solid-liquid method washing solid sample with solvent
Soxhlet extraction is a semi-continuous, solid-liquid extraction method used to determine crude fat content. It places a dry, solid sample inside a porous thimble, where it is repeatedly washed with a redistilled organic solvent via a siphon mechanism. This process continuously extracts lipids, leaving them concentrated in the boiling flask for gravimetric measurement.

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79. (B) Most food proteins contain approximately 16% nitrogen by weight
The standard nitrogen-to-protein conversion factor of six point two five is mathematically derived from the assumption that typical food proteins contain approximately sixteen percent nitrogen by weight. Dividing one hundred by sixteen yields six point two five. Because specific proteins vary in amino acid composition, tailored conversion factors are used for precise matrices.

80. (A) Both A and R are true and R is the correct explanation of A
The Gerber method is a rapid, widely accepted volumetric test for fat determination in milk and dairy products. It utilizes concentrated sulfuric acid to digest milk proteins and break down the fat globule membrane. This liberates the fat, which is separated from the aqueous phase using amyl alcohol and centrifugation in a butyrometer.

81. (A) It raises sulfuric acid's boiling point to accelerate digestion
In Kjeldahl digestion, potassium sulfate is added to the digestion flask to raise the boiling point of concentrated sulfuric acid. Raising the temperature of the acid bath accelerates the chemical oxidation of organic matter, significantly reducing the overall digestion time required to convert complex nitrogen compounds into ammonium sulfate.

82. (C) Statement I is correct but Statement II is incorrect
The Dumas method is automated, rapid, and avoids hazardous liquid acids, making it much faster than the classical Kjeldahl method. However, the standard Kjeldahl digestion does not measure inorganic nitrogen forms like nitrates and nitrites without specific chemical modifications, whereas Dumas combusts and measures almost all forms of nitrogen.

83. (A) P-IV, Q-III, R-I, S-II
Fat extraction methods are tailored to specific matrices. Soxhlet extraction uses a siphon mechanism for solid samples. The Mojonnier method employs a specialized two-chamber flask for multiple liquid-liquid extractions, while the Rose-Gottlieb method uses a mixture of ammonia, ethanol, diethyl ether, and petroleum ether. The Babcock method utilizes sulfuric acid in specialized bottles.

84. (D) It results in the conversion of free fatty acids into complex triglycerides
Acid hydrolysis is a crucial pre-treatment that uses hydrochloric acid to break down protein-lipid and carbohydrate-lipid complexes in baked or extruded foods. This process liberates trapped fats, making them available for subsequent solvent extraction. It does not convert free fatty acids into complex triglycerides, as acid hydrolysis breaks ester bonds rather than synthesizing them.

85. (B) Add an anti-foaming agent like octyl alcohol
When analyzing carbohydrate-rich samples using the Kjeldahl method, excessive foaming during digestion can cause sample loss and incomplete reactions. To manage this issue safely and effectively, the analyst should add a small amount of an anti-foaming agent, such as octyl alcohol or paraffin, which lowers surface tension and suppresses foam formation.

86. (C) Kjeldahl measures total nitrogen, not true protein; melamine is rich in nitrogen
Melamine is a nitrogen-rich compound that is sometimes used as an adulterant to artificially boost the apparent protein content of milk powder. Traditional testing methods like Kjeldahl and Dumas measure total nitrogen rather than true protein, and fail to differentiate between protein-derived nitrogen and non-protein nitrogen, allowing this chemical adulteration to go undetected.

87. (D) Petroleum ether – Non-polar solvent for lipids
Petroleum ether is a highly non-polar organic solvent commonly used for extracting crude fats and lipids from dry food matrices. It selectively dissolves neutral triglycerides while minimizing the co-extraction of polar, non-fat components. Conversely, water, acetic acid, and methanol are polar solvents that are unsuitable for extracting non-polar lipids.

88. (A) Dilute boric acid with indicator
In the direct titration Kjeldahl method, liberated ammonia gas is distilled and collected in a dilute boric acid solution containing a pH indicator. The ammonia reacts with boric acid to form ammonium borate, causing a color change. This basic complex is then directly titrated with a standardized strong acid to calculate the nitrogen content.

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89. (B) Saponification
The classical Kjeldahl procedure for determining organic nitrogen consists of three distinct, highly sequential steps: acid digestion, alkaline distillation, and quantitative titration. Saponification is a completely different chemical process that hydrolyzes lipid molecules into glycerol and fatty acid salts, and is not a part of this analytical nitrogen determination system.

90. (B) True Protein – Calculated by multiplying Total Nitrogen by 100
Total nitrogen can be measured directly using Kjeldahl or Dumas methods. However, true protein is calculated by subtracting non-protein nitrogen from total nitrogen before multiplying by the conversion factor. Simply multiplying total nitrogen by one hundred is mathematically incorrect and does not yield true protein or crude protein levels.

91. (A) 100 minus the sum of moisture, protein, fat, and ash percentages
Total carbohydrate "by difference" is an indirect calculation method used in proximate analysis. It is defined as one hundred percent minus the sum of the percentages of moisture, crude protein, crude fat, and ash. This approach groups all carbohydrates and organic acids together rather than measuring individual sugar molecules directly.

92. (A) I and III only
The enzymatic-gravimetric method for determining dietary fiber relies on specific enzymes to digest digestible carbohydrates and proteins. This process utilizes heat-stable alpha-amylase to gelatinize starch, followed by amyloglucosidase to complete the digestion of starch into glucose. Soluble dietary fiber is subsequently precipitated using ethanol, rather than concentrated sulfuric acid.

93. (D) Crude fibre is measured by hot acid/alkali extraction, destroying most hemicellulose and pectin
Crude fiber is measured using a harsh chemical method that boils the sample in dilute acid followed by dilute alkali. This treatment destroys pectin, hemicellulose, and most cellulose, leaving only highly resistant cellulose and lignin. Dietary fiber measures all non-digestible carbohydrates, including soluble and insoluble fractions, using gentler enzymatic-gravimetric procedures.

94. (C) Ascorbic acid
Titrating with two, six-dichlorophenolindophenol is a standard method used to determine vitamin C content. Ascorbic acid acts as a strong reducing agent that donates electrons to the oxidized dye. This chemical reaction reduces the blue indicator to a pink intermediate and finally to a colorless compound, allowing visual quantification of ascorbic acid.

95. (A) Both A and R are true and R is the correct explanation of A
The saponification value of a fat represents the milligrams of potassium hydroxide required to saponify one gram of fat. It is inversely proportional to the mean molecular weight of the fatty acids present. Fats containing short-chain fatty acids have more molecules per gram, requiring more potassium hydroxide for complete hydrolysis than long-chain fats.

96. (D) Contains many carbon-carbon double bonds
The Wijs method determines the iodine value of a fat or oil, which measures the degree of unsaturation. A high titration value indicating high iodine absorption chemically demonstrates that the oil contains many carbon-carbon double bonds. This provides critical information about the susceptibility of the oil to oxidative rancidity during storage.

97. (C) Statement I is correct but Statement II is incorrect
Titratable acidity measures the total concentration of titratable hydrogen ions in a food sample, representing the total acid content. It is determined by titrating the sample with a standard basic solution until a specific endpoint is reached. This is conceptually different from pH, which measures only the active, free hydrogen ions.

98. (A) P-II, Q-IV, R-I, S-III
Titration parameters target distinct chemical characteristics of food. The iodine value measures lipid unsaturation, while the saponification value indicates the average molecular weight of fatty acids. Peroxide values measure primary oxidative rancidity by quantifying hydroperoxides, and titratable acidity determines the total acid content, which is expressed as a predominant organic acid.

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99. (A) High-Performance Liquid Chromatography (HPLC) cannot be used as a direct method for analyzing individual sugars
High-Performance Liquid Chromatography is a powerful, direct analytical method widely used to separate, identify, and quantify individual sugars in food. Chromatographic methods provide high resolution and sensitivity compared to classical copper-reduction methods. Colorimetric techniques like the phenol-sulfuric acid method and copper reduction assays like the Lane-Eynon titration are also common.

100. (D) 95% Ethanol
In the gravimetric determination of dietary fiber, separating soluble from insoluble fractions is critical. Ninety-five percent ethanol is conventionally added to the enzymatically digested sample to precipitate the soluble dietary fiber. This allows the soluble portion to be recovered as a solid residue along with the insoluble fraction for subsequent filtration and gravimetric weighing.

101. (B) Using a fluorometric or potentiometric method
Analyzing vitamin C in highly pigmented food matrices like red or dark orange juices using the classical visual dye titration is difficult because the natural pigments obscure the pink endpoint. To overcome this limitation, analysts use fluorometric or potentiometric methods, which measure chemical signals rather than relying on subjective visual endpoint observations.

102. (C) Phenolphthalein – Acidity indicator, pink at pH ~8.2
Selecting the correct indicator is essential for accurate visual endpoint determination. Phenolphthalein is a standard acid-base indicator used to measure titratable acidity, turning from colorless to pink at a pH of approximately eight point two. Conversely, starch is used in iodometric titrations, and methylene blue is used in reducing sugar determinations.

103. (D) 1.25% Sulfuric acid and 1.25% Sodium hydroxide
The classical gravimetric determination of crude fiber involves boiling the food sample sequentially in standardized solutions of one point two five percent sulfuric acid followed by one point two five percent sodium hydroxide. This treatment mimics digestion by dissolving starch, proteins, and soluble carbohydrates, leaving only the highly resistant fiber components behind.

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104. (A) Soluble pectins
Classical crude fiber determination uses hot acid and alkali washes that dissolve highly soluble carbohydrates and structural polymers. Pectin is a soluble dietary fiber that is completely hydrolyzed and removed during this aggressive chemical treatment, meaning it is not measured in crude fiber. In contrast, cellulose and lignin are partially recovered as residue.

105. (B) Peroxide Value – Phenolphthalein indicator turns from pink to colorless
In the classical determination of peroxide value, standard starch solution is used as the indicator rather than phenolphthalein. The titration endpoint is marked by the sharp disappearance of the dark blue starch-iodine complex as it is reduced to colorless. Phenolphthalein is an acid-base indicator, which is unsuitable for this iodometric redox titration.

106. (B) The milliequivalents of active oxygen (peroxides) present in 1 kilogram of fat
The peroxide value of an oil measures the concentration of hydroperoxides formed during the initial stages of lipid oxidation. It is defined as the milliequivalents of active oxygen present in one kilogram of fat. This value is a critical quality indicator that monitors early oxidative degradation before secondary volatile compounds are formed.

107. (B) I, II and III only
The thiobarbituric acid test is a widely used colorimetric assay that measures secondary lipid oxidation products. It specifically reacts with malondialdehyde, a major aldehyde produced during the breakdown of hydroperoxides, to form a distinct red-pink chromogen. Because it targets secondary products, it is unsuitable for detecting the very early stages of oxidation.

108. (C) The phenol-sulfuric acid method dehydrates carbohydrates to furfural, producing a yellow color with phenol
The phenol-sulfuric acid method is a highly robust, colorimetric assay used to determine total carbohydrates. The strong sulfuric acid dehydrates carbohydrates into furfural or hydroxymethylfurfural derivatives. These compounds subsequently react with phenol to

produce a stable yellow-orange complex that is quantitatively measured spectrophotometrically in the visible light spectrum.

109. (D) Hydrolytic rancidity
An increase in the free fatty acid content of frying oil indicates that the oil has undergone hydrolytic rancidity. This chemical reaction occurs when water from food hydrolyzes the ester bonds of triglycerides under high heat, releasing free fatty acids. It is distinct from oxidation, polymerization, or hydrogenation reactions.

110. (A) Both A and R are true and R is the correct explanation of A
A food product can exhibit a low pH while maintaining a high buffering capacity. This capacity is governed by the concentration of weak acids and their conjugate bases present in the food matrix, which actively resist changes in pH upon the addition of acids or alkalis. It explains why some highly acidic foods require substantial titrable base.

111. (B) FSSAI Manual of Methods of Analysis
In India, the primary and legally binding analytical protocols for food safety enforcement are detailed in the Food Safety and Standards Authority of India Manual of Methods of Analysis. Under the Food Safety and Standards Act, these official manuals provide the standardized, validated methodologies that laboratories must follow to resolve legal disputes.

112. (C) Statement I is correct but Statement II is incorrect
The Folin-Ciocalteu method is a widely accepted colorimetric assay used to determine total phenolic content in foods. It relies on the reduction of phosphomolybdate-phosphotungstate reagents by phenolic compounds in an alkaline medium. This chemical reaction produces a blue-colored complex, rather than a red one, which is measured spectrophotometrically at seven hundred and sixty-five nanometers.

113. (A) P-IV, Q-II, R-III, S-I
Standard-setting bodies serve distinct roles in food analysis. AOAC International publishes official methods of analysis, while the Bureau of Indian Standards provides national standards. The International Organization for Standardization defines laboratory quality systems, and Codex Alimentarius establishes international food safety and quality standards developed under the Food and Agriculture Organization and World Health Organization.

114. (C) Temperature compensation is unnecessary because pH values are completely independent of temperature
Accurate pH meter calibration requires utilizing at least two standard buffer solutions that bracket the expected pH of the food. Rinsing electrodes between measurements prevents cross-contamination. Temperature compensation is highly necessary, as pH values are temperature-dependent due to changes in ion dissociation, making temperature control critical for accurate measurements.

115. (A) Primary peroxides broke down into secondary aldehydes, indicating advanced oxidation
A low peroxide value paired with a high thiobarbituric acid value and a strong rancid odor indicates advanced lipid oxidation. During the later stages of autoxidation, unstable primary hydroperoxides rapidly decompose into secondary volatile aldehydes and ketones. Consequently, measuring only the peroxide value can incorrectly suggest that an oxidized oil is fresh.

116. (D) Deep blue-black
In starch colorimetric assays, iodine is added to the sample to form a coordinate complex. Amylose, which has a helical structure, physically entraps iodine molecules within its coil. This structural alignment alters light absorption, producing a highly characteristic, deep blue-black color that is easily detected and quantified using spectrophotometry.

117. (B) Peroxide Value (PV) – Measures hydroperoxides
Selecting the correct lipid oxidation parameter is essential for accurate shelf-life and quality assessments. The peroxide value specifically measures the concentration of hydroperoxides, which are the primary products of lipid oxidation. Conversely, free fatty acids measure hydrolytic degradation, and the thiobarbituric acid test quantifies secondary oxidation products.

118. (C) Standardized sodium thiosulfate
Determining the peroxide value using classical wet chemistry involves an iodometric titration. Potassium iodide is added to the sample, and hydroperoxides oxidize iodide ions to liberate

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free iodine. This liberated iodine is subsequently titrated with a standardized sodium thiosulfate solution, using a starch indicator to detect the colorless endpoint.

119. (D) OSHA (Occupational Safety and Health Administration)
Standard reference analytical methods for food are published by specialized organizations like AOAC International, the Bureau of Indian Standards, and the American Association of Cereal Chemists. The Occupational Safety and Health Administration is a government agency focused on workplace safety and health standards, rather than providing analytical testing protocols for food.

120. (A) Biuret reagent – Complex carbohydrates
Colorimetric reagents must be matched to their correct target chemical compounds. The Biuret reagent specifically detects proteins and peptides by reacting with peptide bonds, and is not used for complex carbohydrates. Conversely, dinitrosalicylic acid targets reducing sugars, Folin-Ciocalteu measures phenolic compounds, and ninhydrin detects free amino acids.

121. (B) A known fractional portion of a sample used for analysis
An aliquot is a precise, representative fractional portion of a larger sample that is measured and used for laboratory analysis. Using aliquots allows technicians to perform multiple identical tests from a single prepared sample, ensuring consistency across replicates and protecting the main sample from contamination during testing.

122. (B) II, III and IV only
Physical tools in sample preparation serve specific roles. Blenders are highly effective for homogenizing soft or semi-solid foods, while ball mills grind dry, hard materials to fine powders. Rifflers are mechanical devices designed to divide granular solids without bias. Mortars and pestles are used for grinding solids, not for liquid-liquid extractions.

123. (A) The probability of rejecting a lot that is actually of acceptable quality
In acceptance sampling, the producer risk is the statistical probability of rejecting a lot that actually meets the specified quality standards. This error represents a Type I error and is costly for manufacturers, as high-quality batches are rejected. Balancing this risk with consumer risk is essential when designing fair, effective sampling plans.

124. (C) Excessive solvent evaporation causing dry-boil hazards
Using highly volatile diethyl ether in a Soxhlet apparatus when laboratory temperatures exceed the solvent's boiling point is dangerous. Under these conditions, the solvent evaporates excessively rapidly and may fail to condense properly. This can cause the boiling flask to dry out, creating a significant fire hazard and preventing proper extraction.

125. (A) Both A and R are true and R is the correct explanation of A
Standard Kjeldahl digestion does not quantitatively reduce and capture inorganic nitrogen forms like nitrates and nitrites as ammonium sulfate. Consequently, analyzing protein in samples with high nitrate levels requires a specific modification, such as adding salicylic acid, to chemically reduce these inorganic compounds, ensuring that all nitrogen is accurately measured.

126. (C) Taking multiple small incremental samples to form a composite sample
Aflatoxins are known to occur in highly localized hotspots within a bulk batch of grain. Because contamination is extremely uneven, drawing a single sample is highly likely to miss these pockets. Taking multiple small, incremental samples from various locations to form a composite sample provides the highest probability of detecting localized contamination.

127. (C) Statement I is correct but Statement II is incorrect
Wet ashing using nitric and perchloric acids is highly effective for destroying complex organic matrices without losing volatile trace metals. However, perchloric acid digestions are hazardous and must never be conducted on open bench tops. They require specialized fume hoods equipped with water wash-down systems to prevent the accumulation of explosive perchlorate salts.

128. (A) P-I, Q-II, R-III, S-IV
Lipid indices measure distinct chemical characteristics using highly specific expressions. The acid value represents the milligrams of potassium hydroxide needed to neutralize free fatty acids in one gram of fat. The saponification

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value measures total ester hydrolysis, while the iodine value indicates fatty acid unsaturation, and the peroxide value quantifies hydroperoxides.

129. (A) Bound water is easily removed by drying in a hot air oven at 100°C for 2 hours
Bound water is chemically or physically bound within the food matrix and cannot be easily removed by standard drying in a hot air oven at one hundred degrees Celsius. Free water is the primary target of standard gravimetric drying methods, while the Dean-Stark method co-distills water with a solvent to prevent thermal degradation.

130. (C) Potassium hydrogen phthalate (KHP)
In volumetric analysis, standardizing a sodium hydroxide solution requires titration against a primary standard. Potassium hydrogen phthalate is the standard primary standard used for this purpose because it is highly stable, non-hygroscopic, easily purified, and has a high molecular weight, which minimizes weighing errors during calibration.

131. (A) Crude fibre
In crude fiber analysis, the sample is sequentially boiled in acid and alkali, and the dried residue is weighed. This residue contains both crude fiber and insoluble minerals. Igniting the residue in a muffle furnace burns away the organic fiber, leaving only inorganic ash. The loss of weight during this ignition represents crude fiber.

132. (D) Nitrogen – Kjeldahl method
The Kjeldahl method is a classical chemical technique designed to quantify total organic nitrogen in various food matrices. The measured nitrogen content is subsequently multiplied by a conversion factor to estimate crude protein. Other methods target different components, such as the Gerber and Soxhlet methods, which are used to measure lipids rather than carbon or sulfur.

133. (B) Titratable acidity (% lactic acid)
Determining the titratable acidity of milk measures both its natural buffering capacity and any developed lactic acid produced by bacterial fermentation. This parameter is expressed as a percentage of lactic acid, which is a key indicator of milk freshness and quality. This test is distinct from fat tests or dye reduction tests.

134. (C) Ability to run without any prior calibration against classical reference methods
Near-infrared spectroscopy offers major advantages over classical analysis, including rapid testing times, non-destructive sample handling, and the ability to measure multiple components simultaneously. However, these instrumental systems cannot operate without prior calibration against classical reference methods, such as Kjeldahl or Soxhlet, which establish the baseline values required for accurate prediction models.

135. (D) Total Carbohydrates – Measured directly by Kjeldahl
Understanding proximate analysis parameters is essential for food characterization. Total carbohydrates are typically calculated indirectly by difference rather than being measured directly using the Kjeldahl method. Conversely, crude protein is estimated from nitrogen, wine acidity is expressed as tartaric acid, and crude fat is measured as an ether extract.

136. (A) Weak acids and their salts
The buffering capacity of a food product is primarily governed by the presence of weak acids and their conjugate salts. These chemical pairs resist significant changes in pH when small amounts of hydrogen or hydroxyl ions are added, helping maintain a stable pH in various biological systems and food formulations.

137. (B) I, III and IV only
AOAC methods undergo extensive multi-laboratory validation before receiving official status, while Bureau of Indian Standards standards define national chemical limits. Method validation includes determining the limit of detection and limit of quantification. Using an unvalidated, in-house method for legal food safety enforcement is legally indefensible because it lacks the necessary scientific validation.

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138. (B) Lowest analyte concentration that can be detected but not quantified
The limit of detection is defined as the lowest concentration of an analyte in a sample that can be reliably detected but not necessarily quantified as an exact value under specified experimental conditions. This parameter is distinct from the limit of quantification, which represents the lowest concentration that can be measured with acceptable precision.

139. (A) Moisture loss and vitamin thermal degradation
High temperatures generated during mechanical grinding in sample preparation can cause significant localized heating. This physical condition can lead to moisture loss and the thermal degradation of heat-sensitive vitamins or volatile compounds. Consequently, cryogenic grinding is often preferred for preparing samples to prevent these alterations and preserve sample integrity.

140. (A) Both A and R are true and R is the correct explanation of A
Wet ashing is preferred over dry ashing for preparing samples for trace metal analysis, such as arsenic and mercury. Wet ashing utilizes liquid oxidizing acids at relatively low temperatures, which prevents the volatilization losses that occur in high-temperature muffle furnaces, ensuring that these elements are fully recovered for analysis.

141. (D) Directly proportional and linear in a specific range
According to the Beer-Lambert law, spectrophotometric absorbance is directly proportional and linear to the concentration of an absorbing chemical complex within a specific concentration range. This linear relationship is essential for creating standard calibration curves, which are used to determine the concentration of unknown analytes in food samples.

142. (C) Statement I is correct but Statement II is incorrect
Warming semi-solid foods like butter gently to a liquid state and stirring continuously is essential to obtain a homogeneous sub-sample. Conversely, thawing frozen foods at room temperature for several days is inappropriate, as it permits rapid microbial growth and alters the original microbiological profile, making the analysis inaccurate.

143. (A) P-II, Q-IV, R-I, S-III
Laboratory instruments utilize distinct physical principles. A refractometer measures the angle of light refraction to estimate soluble solids, while a spectrophotometer measures light transmission or absorption. A pH meter measures electrical potential differences using electrodes, and muffle furnaces heat samples to high temperatures to combust organic matter.

144. (D) Digital evidence (like photographs) of the sampling process is strictly prohibited under FSSAI rules
Documentation of field samples by a food safety officer must provide an accurate, transparent record of the physical condition of the sample at seizure. Form VA is issued to the food business operator, and witnesses must sign the seizure paperwork. Digital evidence, including photographs, is fully permitted and recommended under modern FSSAI guidelines.

145. (A) Increase the volume or concentration of the boric acid receiving solution
If the boric acid buffer in the receiving flask is exhausted during Kjeldahl distillation, it can no longer capture all the liberated ammonia, leading to an underestimation of nitrogen. To prevent this, the analyst must increase the volume or concentration of the boric acid solution to ensure sufficient capacity for the expected ammonia.

146. (C) Lab B is more accurate because specific proteins have distinct nitrogen ratios
Using specific nitrogen-to-protein conversion factors is critical for accurate protein determination. While six point two five is a common general factor, specific proteins contain different nitrogen ratios based on their amino acid profile. Using a specific factor like five point seven one for soy products provides a more accurate measurement of true protein content.

147. (A) Analytical results – Numerical findings compared to limits
An official food safety report must contain verified, legally binding information. The analytical results represent numerical findings that are compared to regulatory safety limits to determine compliance. Other components, such as the date of receipt and reference methods, must be standardized rather than reflecting the subjective preferences of the individual analyst.

148. (D) Moisture content
Moisture content is determined gravimetrically by measuring the weight loss of a sample after heating it to a constant weight in a hot air oven. This weight loss represents the evaporated water, allowing direct calculation of the moisture percentage. It is a standard reference method that is widely used in food analysis.

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149. (B) Calcium

Standard Kjeldahl and Dumas combustion methods are designed specifically to quantify total nitrogen, which is subsequently used to calculate apparent protein content and non-protein nitrogen fractions. These methods are organic nitrogen tests and are not designed to measure inorganic minerals like calcium, which require atomic absorption or emission spectroscopy.

150. (C) Colorimetry – Measuring the mass of an element by burning it into a solid ash

Analytical food analysis methods utilize distinct physical and chemical mechanisms. Colorimetry is an optical method that measures the intensity of light absorption by colored chemical complexes, and is not a gravimetric ashing technique. Conversely, volumetry relies on titration volumes, gravimetry on isolating weights, and chromatography on separation across phases.

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CHAPTER 22
Instrumental Analytical Techniques

1. Which of the following best describes the core principle of High Performance Liquid Chromatography (HPLC) in food analysis?
(A) Separation of analytes based on partition between a liquid mobile phase and solid stationary phase.
(B) Separation of volatile aroma compounds based on their physical boiling points in a gaseous mobile phase.
(C) Ionization of gas-phase molecules followed by separation based on their mass-to-charge (m/z) ratio.
(D) Absorption of electromagnetic radiation by chemical bonds leading to specific vibrational transitions.

2. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Reversed-phase HPLC is the most widely used mode for separating vitamins and amino acids in food analysis.
Reason (R): In reversed-phase HPLC, the stationary phase is non-polar and the mobile phase is polar, allowing effective separation of polar to moderately polar compounds.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

3. Which of the following statements is correct regarding Gas Chromatography (GC) columns?
(A) Capillary columns consist of a fused silica tube coated internally with a stationary phase thin film.
(B) Packed columns generally provide higher resolution than capillary columns for complex food aroma profiles.
(C) The carrier gas in GC actively interacts with the chemical analytes to facilitate their chromatographic separation.
(D) Increasing the column oven temperature isothermally will increase the overall retention time of all analytes.

4. Given below are statements regarding GC detectors used in food safety:
I. Flame Ionization Detector (FID) is highly sensitive to most organic compounds.
II. Electron Capture Detector (ECD) is highly specific for halogenated pesticides.
III. Thermal Conductivity Detector (TCD) is a destructive detector used only for trace analysis.
IV. Nitrogen-Phosphorus Detector (NPD) is specifically used for organophosphorus and organonitrogen pesticides.
Which of the above statements are correct?
(A) I, II, and III
(B) II, III, and IV
(C) I, II, and IV
(D) I, III, and IV

5. In the context of chromatography, what is the exact definition of "retention time"?
(A) The minimum time required for the mobile phase solvent to travel from the injector port to the detector.
(B) The time elapsed between sample injection and the maximum elution peak response of a target analyte.
(C) The total lifetime a given column can be continuously used before the stationary phase completely degrades.
(D) The equilibration time taken by the primary detector system before initiating the next sample injection.

6. Match the instrumental analytical techniques listed in List I with their common food applications in List II:
List I: (Techniques)
P. HPLC
Q. GC
R. AAS
S. NMR
List II: (Applications)

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I. Fatty acid profiling of edible oils
II. Heavy metal contamination (e.g., Lead, Cadmium)
III. Quantification of water-soluble vitamins
IV. Non-destructive food authenticity and structural elucidation
(A) P-III, Q-I, R-II, S-IV
(B) P-I, Q-II, R-III, S-IV
(C) P-III, Q-II, R-I, S-IV
(D) P-IV, Q-I, R-II, S-III

7. Which of the following represents an incorrect pair regarding HPLC operation modes?
(A) Normal Phase — Polar stationary phase and non-polar mobile phase
(B) Reversed Phase — Non-polar stationary phase and polar mobile phase
(C) Ion Exchange — Separation based on ionic interactions with the stationary phase
(D) Size Exclusion — Separation based strictly on analyte charge

8. What is the correct sequence of steps involved in a typical GC-MS analysis of pesticide residues in food?
I. Ionization of separated compounds in the mass spectrometer.
II. Separation of compounds in the capillary column.
III. Extraction and cleanup of the food sample (e.g., QuEChERS).
IV. Mass analysis and generation of a fragmentation pattern.
(A) III → I → II → IV
(B) III → II → I → IV
(C) II → III → I → IV
(D) III → II → IV → I

9. Given below are two statements regarding Gas Chromatography (GC) of fatty acids:
Statement I: Triglycerides must be converted to Fatty Acid Methyl Esters (FAMEs) before GC analysis to increase their volatility.
Statement II: Saponification is never used during the preparation of FAMEs for GC analysis.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

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10. A food safety laboratory needs to quantify trace levels of highly volatile aroma compounds in a wine sample. Which analytical setup is most appropriate for this application?
(A) Size Exclusion Chromatography with a Refractive Index detector
(B) Solid-Phase Microextraction (SPME) coupled with GC-MS
(C) Atomic Absorption Spectroscopy with a graphite furnace
(D) Liquid-Liquid extraction followed by Inductively Coupled Plasma Mass Spectrometry

11. Which of the following statements about Atomic Absorption Spectroscopy (AAS) is incorrect?
(A) Flame AAS typically offers lower detection limits (higher sensitivity) than Graphite Furnace AAS.
(B) AAS relies on the absorption of characteristic wavelengths of light by free gaseous ground-state atoms.
(C) A Hollow Cathode Lamp is specifically chosen to emit the sharp emission spectrum of the target element.
(D) The liquid sample must be completely vaporized and atomized before the absorption of light can occur.

12. In AAS, what is the primary effect of using a graphite furnace instead of a traditional flame atomizer?
(A) It retains the atomized sample in the optical path longer, significantly improving detection sensitivity.
(B) It reduces the required atomization temperature, allowing analysis of heat-sensitive vitamins.
(C) It eliminates all matrix interferences by instantly vaporizing the sample matrix without charring.
(D) It broadens the emission spectral lines of the hollow cathode lamp, allowing multi-element simultaneous detection.

13. Which of the following is a correct pair regarding Inductively Coupled Plasma (ICP) techniques?
(A) ICP-OES — Measures the mass-to-charge ratio of ions generated in a plasma
(B) ICP-MS — Measures the emission of light from excited atoms and ions
(C) Isobaric Interference — An interference unique to ICP-OES caused by overlapping

emission wavelengths
(D) Argon Gas — The standard gas used to generate and sustain the high-temperature plasma

14. As a Food Safety Officer, you are tasked with identifying both trace heavy metals (ppb levels) and major essential minerals (ppm levels) simultaneously in a complex infant formula matrix. Which instrument is most competent for this multi-element analysis?
(A) Flame Atomic Absorption Spectroscopy (FAAS)
(B) High Performance Liquid Chromatography with UV detector (HPLC-UV)
(C) Inductively Coupled Plasma Mass Spectrometry (ICP-MS)
(D) Near Infrared Reflectance (NIR) Spectroscopy

15. Which of the following compounds is generally NOT suitable for analysis using standard Gas Chromatography without derivatization?
(A) Short-chain volatile fatty acids
(B) Monosaccharides and free amino acids
(C) Low molecular weight aroma esters
(D) Organochlorine pesticide residues

16. What is the typical wavelength range utilized in Near Infrared Reflectance (NIR) spectroscopy for food composition analysis?
(A) 200 nm to 400 nm
(B) 400 nm to 750 nm
(C) 2500 nm to 25000 nm
(D) 780 nm to 2500 nm

17. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): NIR spectroscopy is widely used for rapid, non-destructive measurement of moisture content in food grains.
Reason (R): Water molecules exhibit strong overtone and combination absorption bands in the NIR spectral region due to O-H stretching.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

18. Which of the following statements is correct regarding Nuclear Magnetic Resonance (NMR) spectroscopy in food analysis?
(A) NMR spectroscopy causes the thermal ionization and fragmentation of food molecules for detector identification.
(B) High-resolution NMR is strictly limited to identifying heavy metal toxic elements like lead and arsenic.
(C) NMR relies on the magnetic spin properties of specific atomic nuclei, such as 1H and 13C.
(D) NMR instruments cannot be used to analyze complex mixtures without prior multi-step chromatographic separation.

19. Given below are statements regarding the applications of FTIR spectroscopy in food quality:
I. It provides a distinct spectral fingerprint based on molecular vibrations.
II. It can detect adulteration in edible oils (e.g., olive oil mixed with palm oil).
III. It requires large volumes of toxic solvents for routine sample preparation.
IV. Attenuated Total Reflectance (ATR) accessories allow direct analysis of liquid and solid foods.
Which of the above statements are correct?
(A) I, II, and III
(B) I, II, and IV
(C) II, III, and IV
(D) I, III, and IV

20. In NMR spectroscopy, what does the term "chemical shift" refer to?
(A) The localized physical movement of the liquid sample tube inside the strong external magnetic field.
(B) The sudden shift in cryogenic temperature required to maintain stable superconducting electromagnet fields.
(C) The direct conversion of a proton spectrum into a carbon spectrum using pulsed radio frequencies.
(D) The difference in resonant frequency of a nucleus relative to a reference standard.

21. Match the spectroscopy techniques listed in List I with their fundamental physical principles in List II:
List I: (Techniques)
P. UV-Visible Spectrophotometry

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Q. FTIR Spectroscopy
R. NMR Spectroscopy
S. Mass Spectrometry (MALDI-TOF)
List II: (Principles)
I. Electronic transitions in valence electrons
II. Vibrational transitions in molecular bonds
III. Magnetic spin transitions of atomic nuclei
IV. Time taken for ions to travel a fixed distance in a vacuum
(A) P-I, Q-II, R-III, S-IV
(B) P-II, Q-I, R-IV, S-III
(C) P-I, Q-III, R-II, S-IV
(D) P-III, Q-II, R-I, S-IV

22. Which of the following is an incorrect pair regarding functional group absorptions in FTIR spectroscopy?
(A) O-H stretch — Broad, strong absorption peak around 3200-3600 cm^{-1}
(B) C=O stretch — Sharp, strong carbonyl peak around 1700-1750 cm^{-1}
(C) N-H stretch — Low frequency peak around 600-800 cm^{-1}
(D) C-H stretch — Strong, distinct peak around 2800-3000 cm^{-1}

23. What is the correct sequence of light path in a basic UV-Visible Spectrophotometer?
I. Detector
II. Monochromator
III. Light Source
IV. Sample Cuvette
(A) III → II → IV → I
(B) III → IV → II → I
(C) II → III → IV → I
(D) IV → III → II → I

24. Given below are two statements regarding UV-Visible Spectrophotometry:
Statement I: The Beer-Lambert law states that absorbance is inversely proportional to the concentration of the absorbing species.
Statement II: Quantitative analysis using UV-Vis is typically performed at the wavelength of maximum absorbance (λ_{max}) to maximize sensitivity.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

25. A regulatory laboratory uses FTIR-ATR to detect the adulteration of pure butter with cheap vegetable fat. The detection relies primarily on evaluating the spectral region characteristic of which functional groups?
(A) Aromatic ring vibrations exclusively
(B) Trans double bonds and ester carbonyl stretching frequencies
(C) Free amino acid N-H stretching exclusively
(D) Metallic ionic bonds in the fingerprint region

26. Which of the following statements about Near Infrared (NIR) spectroscopy is incorrect?
(A) NIR spectra consist of broad, overlapping overtone and combination bands.
(B) NIR is highly specific and can identify unknown molecular structures as easily as high-resolution NMR.
(C) Calibration of NIR instruments requires reference data from primary analytical methods (e.g., Kjeldahl for protein).
(D) Chemometric tools such as Partial Least Squares (PLS) regression are essential for NIR data interpretation.

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27. What is the primary cause of a "bathochromic shift" (red shift) in the UV-Vis spectrum of a food colorant?
(A) An increase in the extent of molecular double-bond conjugation.
(B) A significant decrease in the physical path length of the sample cuvette.
(C) A sudden reduction in the overall concentration of the analyte in the solvent.
(D) Switching the primary light source from a tungsten lamp to a deuterium lamp.

28. Which of the following is a correct pair regarding electron microscopy techniques?
(A) SEM — Measures the absorbance of visible light scattered by surface electrons.
(B) Freeze-fracture SEM — Used to determine heavy metal elemental composition.
(C) TEM — Requires ultra-thin sample sections for electron transmission.
(D) TEM negative staining — Uses basic fluorescent dyes to enhance image contrast.

29. An investigator needs to study the three-dimensional surface morphology of starch granules from a novel potato variety at high

magnification (10,000x) with great depth of field. Which instrument is most appropriate?
(A) UV-Visible Spectrophotometer
(B) Confocal Laser Scanning Microscopy (CLSM)
(C) High Performance Liquid Chromatography (HPLC)
(D) Scanning Electron Microscopy (SEM)

30. Which of the following applications is generally NOT feasible using standard 1H NMR spectroscopy in food science?
(A) Determining the absolute ratio of saturated to unsaturated fatty acids in plant oils.
(B) Differentiating distinct geographical origins of wines via metabolomic profiling assays.
(C) Measuring trace pesticide residues at parts-per-trillion (ppt) levels directly.
(D) Assessing the authenticity of honey samples by analyzing specific profiling of sugars.

31. In Transmission Electron Microscopy (TEM), what acts as the source of illumination to create the image?
(A) A focused beam of monochromatic laser light
(B) A high-energy beam of electrons emitted from a cathode
(C) Ultraviolet radiation from a deuterium lamp
(D) Infrared radiation generated by a heated ceramic filament

32. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Transmission Electron Microscopy (TEM) provides higher spatial resolution than Scanning Electron Microscopy (SEM).
Reason (R): The electron beam in TEM transmits through ultra-thin specimens, whereas SEM captures secondary electrons emitted from the specimen's surface, limiting its maximum resolution compared to TEM.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

33. Which of the following statements is correct regarding the operation of a conventional Scanning Electron Microscope (SEM)?
(A) Non-conductive food samples must be coated with conductive gold or carbon.
(B) The SEM chamber operates at atmospheric pressure to prevent sample dehydration.
(C) Food samples must be sliced to a thickness of less than 100 nanometers before mounting.
(D) It primarily provides structural information about the internal organelles of bacterial cells.

34. Given below are statements regarding Fluorescence Microscopy in food analysis:
I. It relies on the absorption of light at a specific wavelength and emission at a longer wavelength.
II. Fluorochromes like Nile Red can be used to specifically visualize fat droplets.
III. It cannot be used to distinguish between live and dead microbial cells.
IV. Autofluorescence can occur naturally in food components like collagen and riboflavin.
Which of the above statements are correct?
(A) I, II, and IV
(B) II, III, and IV
(C) I, II, and III
(D) I, III, and IV

35. How is "fluorescence" defined in the context of microscopic analytical techniques?
(A) The immediate emission of light at a longer wavelength by a substance after absorbing radiation.
(B) The emission of high-energy electrons from a sample surface when bombarded with intense photons.
(C) The delayed emission of visible light in the dark long after the excitation source is removed.
(D) The multi-directional scattering of light by colloidal protein particles in a liquid suspension.

36. Match the microscopy techniques listed in List I with their distinctive features in List II:
List I: (Microscopy Techniques)
P. Fluorescence Microscopy
Q. CLSM (Confocal)
R. SEM
S. TEM
List II: (Features)
I. Optical sectioning using a spatial pinhole
II. Visualization of internal nanostructures in ultra-thin sections

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III. High depth-of-field 3D surface imaging
IV. Uses dichroic mirrors and emission filters for targeted specific molecular visualization
(A) P-IV, Q-I, R-III, S-II
(B) P-I, Q-IV, R-II, S-III
(C) P-IV, Q-III, R-I, S-II
(D) P-I, Q-II, R-III, S-IV

37. Which of the following is an incorrect pair regarding stains/fluorophores and their targets in food microscopy?
(A) Nile Blue/Nile Red — Lipids
(B) FITC (Fluorescein isothiocyanate) — Heavy metal ions
(C) Calcofluor White — Carbohydrates (e.g., cellulose)
(D) DAPI — Nucleic acids (DNA)

38. What is the standard sequence of sample preparation for conventional Transmission Electron Microscopy (TEM) of a biological food tissue?
I. Sectioning into ultra-thin slices using an ultramicrotome
II. Primary fixation (e.g., with glutaraldehyde)
III. Embedding in a resin block
IV. Dehydration through a graded ethanol series
(A) II → IV → III → I
(B) IV → II → III → I
(C) II → III → IV → I
(D) III → II → IV → I

39. Given below are two statements regarding Confocal Laser Scanning Microscopy (CLSM):
Statement I: CLSM eliminates out-of-focus light or glare in specimens whose thickness exceeds the focal plane.
Statement II: A major advantage of CLSM is the ability to reconstruct 3D structures from a series of 2D optical sections.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

40. A researcher wants to study the spatial distribution of the protein network and fat globules in cheese without cutting physically thin sections that might disrupt the delicate structure. Which microscopic technique is most suitable?
(A) Confocal Laser Scanning Microscopy (CLSM)
(B) Transmission Electron Microscopy (TEM)
(C) Atomic Absorption Spectroscopy (AAS)
(D) Scanning Electron Microscopy (SEM)

41. Which of the following statements about Confocal Laser Scanning Microscopy (CLSM) is incorrect?
(A) It requires the sample to be fluorescent, either naturally or via staining.
(B) It uses an electron beam instead of a laser to excite the fluorophores.
(C) It can non-destructively image deep within a thick specimen without physical sectioning.
(D) It is widely used to study biofilm architecture in food microbiology.

42. What is the primary reason osmium tetroxide (OsO4) is used during the preparation of samples for TEM?
(A) It completely dissolves the embedding resin to expose biological structures.
(B) It acts as a secondary fixative providing electron contrast to lipids.
(C) It makes the sample surface electrically conductive to prevent charging.
(D) It introduces highly specific fluorescent markers to target active proteins.

43. Which of the following represents a correct pair comparing optical and electron microscopes?
(A) Electron Microscope — Operates in a vacuum to prevent electron scattering.
(B) Optical Microscope — Employs advanced magnetic lenses to focus visible light.
(C) Optical Microscope — Achieves a maximum spatial resolution of about 0.1 nanometer.
(D) Electron Microscope — Produces captured images strictly displayed in natural true colors.

44. An analyst needs to assess the flowability and agglomeration behavior of spray-dried milk powder. Which imaging tool will best provide high-resolution topographical data of the powder particles?
(A) Transmission Electron Microscopy (TEM)
(B) Inductively Coupled Plasma Mass Spectrometry (ICP-MS)
(C) Scanning Electron Microscopy (SEM)

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(D) Fourier Transform Infrared (FTIR) Spectroscopy

45. Which of the following is considered a negative aspect or limitation of standard fluorescence microscopy in food research?
(A) The complete inability to utilize multiple fluorophores in a single sample.
(B) The strict requirement for hydrated food samples to be analyzed under high vacuum.
(C) The physical destruction of the delicate sample due to extreme heating by the light.
(D) The rapid photobleaching of fluorescent dyes under intense light excitation.

46. What fundamental biological interaction forms the basis of Enzyme-Linked Immunosorbent Assay (ELISA)?
(A) The hybridization of complementary DNA strands.
(B) The catalytic conversion of a substrate by an immobilised enzyme without antibodies.
(C) The specific binding between an antigen and its corresponding antibody.
(D) The selective permeability of a nitrocellulose membrane.

47. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Sandwich ELISA is highly specific and is commonly used for detecting food allergens.
Reason (R): In Sandwich ELISA, the antigen is bound between a capture antibody and a detection antibody, requiring the antigen to have at least two binding sites (epitopes).
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

48. Which of the following statements is correct regarding Lateral Flow Immunoassays (LFIA) for food testing?
(A) They require complex, benchtop laboratory equipment for routine result analysis.
(B) They utilize high-resolution mass spectrometry to confirm target toxins.
(C) Capillary action is mechanically blocked to hold the sample on the application pad.
(D) They are designed primarily for rapid, on-site qualitative screening.

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49. Given below are statements regarding essential steps in a standard indirect ELISA protocol:
I. Coating the microtiter plate with the antigen.
II. Adding a blocking buffer to prevent non-specific binding.
III. Adding an enzyme-conjugated secondary antibody.
IV. Adding a substrate to generate a measurable colorimetric signal.
Which of the above statements are correct?
(A) I, II, and III
(B) I, III, and IV
(C) II, III, and IV
(D) I, II, III, and IV

50. In immunological techniques such as ELISA, what is the definition of "antibody titer"?
(A) The exact molecular mass of the primary antibody measured in Daltons.
(B) The time required for target antigen and secondary antibody to hybridize.
(C) The highest serum dilution producing a detectable immune response.
(D) The total substrate volume required to initiate a complete color shift.

51. Match the ELISA components listed in List I with their typical functions in List II:
List I: (ELISA Components)
P. Microtiter Plate
Q. Blocking Agent (e.g., BSA)
R. Enzyme (e.g., HRP)
S. Chromogenic Substrate (e.g., TMB)
List II: (Functions)
I. Catalyzes a chemical reaction to produce a signal
II. Changes color upon enzymatic conversion
III. Solid support for immobilizing antigens or antibodies
IV. Occupies unbound sites on the plate to reduce background noise
(A) P-III, Q-IV, R-I, S-II
(B) P-IV, Q-III, R-II, S-I
(C) P-III, Q-I, R-IV, S-II
(D) P-II, Q-IV, R-I, S-III

52. Which of the following is an incorrect pair regarding the types of ELISA?
(A) Direct ELISA — Antigen is coated on the

plate and detected by a single enzyme-conjugated primary antibody.
(B) Indirect ELISA — Uses a primary antibody for binding the antigen and an enzyme-conjugated secondary antibody for detection.
(C) Sandwich ELISA — Requires matched antibody pairs (capture and detection) specific to the target antigen.
(D) Competitive ELISA — A higher concentration of analyte in the sample results in a stronger final color signal.

53. What is the typical sequence of events in a Competitive ELISA for detecting mycotoxins in grain?
I. Addition of sample (containing unlabeled mycotoxin) and enzyme-labeled mycotoxin.
II. Washing step to remove unbound molecules.
III. Coating of microtiter wells with specific anti-mycotoxin antibodies.
IV. Addition of substrate and measurement of color intensity.
(A) III → I → II → IV
(B) I → III → II → IV
(C) III → II → I → IV
(D) I → II → III → IV

54. Given below are two statements regarding Lateral Flow Immunoassays (LFIA):
Statement I: The appearance of a line at the Control (C) zone indicates that the sample flowed correctly and the assay reagents are functioning.
Statement II: In a competitive LFIA format, the absence of a line at the Test (T) zone indicates a positive result for the target analyte.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

55. A Food Safety Officer needs to immediately verify if a production line has been adequately cleaned of peanut residues before starting a new batch of food. Which analytical technique is most practical for this on-site rapid assessment?
(A) Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES)
(B) Gas Chromatography-Mass Spectrometry (GC-MS)
(C) Fourier Transform Infrared (FTIR) Spectroscopy
(D) Lateral Flow Immunoassay (LFIA) specific for peanut proteins

56. Which of the following statements about the Polymerase Chain Reaction (PCR) is incorrect?
(A) PCR relies on an RNA polymerase to synthesize new DNA strands.
(B) It requires specific oligonucleotide primers that flank the target DNA sequence.
(C) The denaturation step typically occurs at temperatures around 94-96°C.
(D) It can exponentially amplify a specific target DNA sequence from a minute amount of starting material.

57. What is the primary reason Taq polymerase is universally used in standard PCR applications?
(A) It possesses a unique catalytic ability to reverse-transcribe RNA to cDNA.
(B) It is highly thermostable and survives DNA denaturation temperatures.
(C) It synthesizes DNA exclusively in the 3' to 5' direction to boost accuracy.
(D) It actively unwinds the double helix without requiring thermal denaturation.

58. Which of the following is a correct pair regarding the standard thermal cycling profile of PCR?
(A) Denaturation — 50-60°C to separate double-stranded DNA templates.
(B) Extension — 72°C to allow polymerase synthesis of new DNA.
(C) Annealing — 94-98°C to allow specific primer-template hybridization.
(D) Hold — -20°C immediately after cycle completion to protect amplicons.

59. A regulatory lab must legally quantify the percentage of Genetically Modified (GM) soy in a shipment of soybeans to ensure it complies with labeling laws (<0.9% threshold). Which technique is most appropriate?
(A) Real-Time Quantitative PCR (qPCR) using specific fluorescent probes
(B) Traditional End-point PCR followed by Agarose Gel Electrophoresis
(C) Sandwich Enzyme-Linked Immunosorbent Assay (ELISA)
(D) Matrix-Assisted Laser Desorption/Ionization Time-of-Flight (MALDI-TOF)

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60. Which of the following is considered a negative aspect or limitation of Lateral Flow Immunoassays compared to laboratory-based ELISA?
(A) They require significantly longer processing times to yield final results.
(B) They require highly specialized laboratory technicians and expensive devices.
(C) They have lower overall sensitivity, leading to possible false negatives.
(D) They are completely unable to utilize monoclonal antibodies in their strips.

61. Which specific gene region is most commonly used as the standard DNA barcode for species identification in animals (e.g., meat and fish authenticity)?
(A) 16S rRNA gene
(B) Ribulose-bisphosphate carboxylase (rbcL) gene
(C) Internal transcribed spacer (ITS) region
(D) Cytochrome c oxidase subunit I (COI) gene

62. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Metagenomics is a powerful tool for analyzing the entire microbial community in a fermented food product without the need for culturing.
Reason (R): Metagenomics involves the direct extraction and sequencing of total environmental DNA, bypassing the bias of culture-dependent methods.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

63. Which of the following statements is correct regarding Hyperspectral Imaging (HSI) in food quality evaluation?
(A) It provides spatial distribution maps lacking any spectral datasets.
(B) It combines imaging and spectroscopy for spatial and spectral data.
(C) It requires sample homogenization and complete chemical extraction.
(D) It uses high-frequency acoustic waves to determine fruit firmness.

64. Given below are statements contrasting Hyperspectral Imaging (HSI) and Multispectral Imaging (MSI):
I. HSI acquires data across hundreds of continuous, narrow spectral bands.
II. MSI uses a few discrete, separated spectral bands.
III. MSI typically involves massive data processing compared to HSI.
IV. HSI provides a complete spectrum for every pixel in the image.
Which of the above statements are correct?
(A) I, II, and IV
(B) II, III, and IV
(C) I, II, and IV
(D) I, III, and IV

65. How is "Metagenomics" best defined in the context of food microbiology?
(A) Analysis of genetic material extracted directly from food samples.
(B) Study of the complete proteome produced by a single cultured species.
(C) Direct modification of plant genomes to boost nutritional composition.
(D) Sequencing of mitochondrial DNA regions for animal species validation.

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66. Match the molecular techniques listed in List I with their primary objectives in food authenticity in List II:
List I: (Molecular Techniques)
P. Real-Time PCR (qPCR)
Q. DNA Barcoding
R. Metagenomics
S. Whole Genome Sequencing (WGS)
List II: (Objectives)
I. Precise tracking of foodborne pathogen outbreaks at strain level
II. Profiling the complex microbiome of raw milk
III. Identification of a single unknown fish fillet to the species level
IV. Exact quantification of target GMO DNA relative to total DNA
(A) P-IV, Q-III, R-II, S-I
(B) P-III, Q-IV, R-I, S-II
(C) P-IV, Q-II, R-III, S-I
(D) P-I, Q-III, R-II, S-IV

67. Which of the following represents an incorrect pair regarding DNA barcoding targets?
(A) Plants — 18S rRNA gene primarily

(B) Animals (Meat/Fish) — COI gene
(C) Bacteria — 16S rRNA gene
(D) Fungi — ITS (Internal Transcribed Spacer) region

68. What is the standard sequence of a metagenomic sequencing pipeline used for identifying food spoilage microbiota?
I. Bioinformatics analysis and taxonomic assignment
II. High-throughput sequencing (e.g., Illumina)
III. Total DNA extraction from the food sample
IV. DNA library preparation and fragmentation
(A) III → IV → II → I
(B) III → II → IV → I
(C) IV → III → II → I
(D) III → IV → I → II

69. Given below are two statements regarding the Electronic Nose (E-nose):
Statement I: An E-nose utilizes an array of non-specific chemical sensors that react to volatile organic compounds (VOCs).
Statement II: The E-nose directly identifies the exact chemical structure of each individual compound in a complex aroma mixture.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

70. A winery wants to monitor the aging process and astringency profile of its wines objectively without relying solely on human tasting panels. Which sensor array technology is most suitable?
(A) Electronic Nose
(B) Atomic Absorption Spectroscopy
(C) Electronic Tongue
(D) Transmission Electron Microscopy

71. Which of the following statements about MALDI-TOF Mass Spectrometry is incorrect?
(A) It stands for Matrix-Assisted Laser Desorption/Ionization Time-of-Flight.
(B) It is a soft ionization technique that prevents extensive fragmentation of large biomolecules.
(C) The time of flight of an ion is proportional to the square root of its mass-to-charge ratio (m/z).
(D) It identifies microorganisms by generating a unique profile of their DNA fragments.

72. In MALDI-TOF analysis, what is the critical role of the "matrix" chemical?
(A) It absorbs laser energy to vaporize and ionize analytes intact.
(B) It seals the sample from the high vacuum of the analyzer flight tube.
(C) It chemically derivatizes small target proteins to make them fluorescent.
(D) It acts as a physical stationary phase to separate target proteins.

73. Which of the following is a correct pair regarding sensor types used in Electronic Nose technology?
(A) QCM sensors — Measure localized changes in sample temperature upon volatile binding.
(B) MOS sensors — Measure changes in electrical conductivity from volatile interactions.
(C) SAW sensors — Measure the visual color change caused directly by volatile compounds.
(D) Colorimetric sensors — Measure physical mass changes of absorbed volatile compounds.

74. A hospital kitchen suspects a batch of pre-cut fruit is contaminated with Listeria monocytogenes. They isolate colonies on agar plates and need definitive identification within minutes. Which advanced technique is rapidly becoming the gold standard for this competency?
(A) Hyperspectral Imaging
(B) MALDI-TOF Mass Spectrometry
(C) 16S rRNA Sanger Sequencing
(D) High Performance Liquid Chromatography

75. Which of the following is a limitation or negative aspect of Hyperspectral Imaging for food quality evaluation?
(A) It generates large datasets requiring complex image processing.
(B) It is unable to map spatial distributions of moisture or fat.
(C) It completely destroys the food sample during scanning cycles.
(D) It is strictly limited to analyzing fully liquid food samples.

76. In the HPLC analysis of water-soluble vitamins, which detector is frequently used for vitamins

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that exhibit natural fluorescence, such as Riboflavin?
(A) Refractive Index Detector (RID)
(B) Conductivity Detector (CD)
(C) Fluorescence Detector (FLD)
(D) Evaporative Light Scattering Detector (ELSD)

77. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Amino acids are typically derivatized before HPLC analysis with a UV-Vis or Fluorescence detector.
Reason (R): Most native amino acids lack a strong chromophore or fluorophore, making direct optical detection difficult at low concentrations.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

78. Which of the following statements is correct regarding the analysis of mycotoxins using HPLC?
(A) Aflatoxins are analyzed using Normal Phase HPLC with a refractive index detector.
(B) HPLC is ineffective for mycotoxins because these compounds are highly volatile.
(C) Immunoaffinity columns are used for sample cleanup and concentration.
(D) Derivatization of Aflatoxin B1 is omitted since it displays maximum fluorescence.

79. Given below are statements regarding extraction techniques prior to chromatographic analysis of pesticides:
I. QuEChERS stands for Quick, Easy, Cheap, Effective, Rugged, and Safe.
II. Dispersive Solid Phase Extraction (dSPE) is a key cleanup step in the QuEChERS method.
III. Soxhlet extraction is preferred over QuEChERS for rapid, high-throughput pesticide screening.
IV. Salts like Magnesium Sulfate (MgSO4) are used in QuEChERS to partition analytes into the organic layer and remove water.
Which of the above statements are correct?
(A) I, II, and III
(B) I, II, and IV
(C) II, III, and IV
(D) I, III, and IV

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80. In High Performance Liquid Chromatography, what is the definition of "gradient elution"?
(A) Maintaining a fully constant mobile phase composition throughout the run.
(B) Steadily shifting the column oven temperature to accelerate peak elution.
(C) Separating compounds based on molecular size using porous stationary phases.
(D) Varying the mobile phase composition during the chromatographic run.

81. Match the HPLC/GC detectors listed in List I with their target analyte characteristics in List II:
List I: (Detectors)
P. Diode Array Detector (DAD)
Q. Refractive Index Detector (RID)
R. Electron Capture Detector (ECD)
S. Flame Photometric Detector (FPD)
List II: (Analyte Characteristics)
I. Electronegative compounds (e.g., organochlorine pesticides)
II. Sulfur or phosphorus-containing compounds
III. Compounds with UV-absorbing chromophores (multi-wavelength)
IV. Universal detector for compounds lacking chromophores (e.g., sugars)
(A) P-III, Q-IV, R-I, S-II
(B) P-IV, Q-III, R-II, S-I
(C) P-III, Q-I, R-IV, S-II
(D) P-I, Q-IV, R-III, S-II

82. Which of the following is an incorrect pair regarding HPLC stationary phases?
(A) C18 (Octadecylsilane) — Standard non-polar, reversed-phase
(B) C8 (Octylsilane) — Standard non-polar, reversed-phase
(C) Aminopropyl — Strictly non-polar, size-exclusion phase
(D) Silica (unbonded) — Standard highly polar, normal-phase

83. A food safety lab is screening agricultural produce for organochlorine pesticide residues (such as DDT and Lindane). To achieve maximum sensitivity and selectivity, avoiding interferences from complex sample matrices, which specific GC detector should be selected?
(A) Electron Capture Detector (ECD)

(B) Thermal Conductivity Detector (TCD)
(C) Flame Ionization Detector (FID)
(D) Nitrogen-Phosphorus Detector (NPD)

84. Given below are two statements regarding the Flame Ionization Detector (FID) in GC:
Statement I: FID response is roughly proportional to the number of carbon atoms present in the organic analyte.
Statement II: FID is highly sensitive to water (H2O) and carbon dioxide (CO_2), making it unsuitable for analyzing aqueous samples.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

85. A manufacturer wants to duplicate the aroma profile of a natural strawberry flavor. They need to identify the exact retention times and mass spectra of the volatile esters present. Which instrumental technique is directly applicable?
(A) HPLC-UV
(B) GC-MS
(C) FTIR Spectroscopy
(D) Transmission Electron Microscopy

86. Which of the following statements about GC-MS ionization is incorrect?
(A) Electron Impact (EI) is a hard technique causing extensive fragmentation.
(B) Chemical Ionization (CI) is a soft technique preserving the molecular ion.
(C) ESI is the standard method to ionize volatile analytes in GC-MS.
(D) Standard EI reference spectra are collected using electron energy of 70 eV.

87. In a typical GC-MS system utilizing a quadrupole mass analyzer, what is the direct cause of ion separation before they reach the detector?
(A) The size-based filtration of target ions through a micro-porous membrane.
(B) The time difference for ions to travel down a field-free vacuum flight tube.
(C) The physical bending of the ion beam trajectory using permanent magnets.
(D) Applying combined DC and RF oscillating fields to four parallel metal rods.

88. Which of the following is a correct pair regarding mass spectrometry terminology?
(A) Molecular Ion Peak (M^+) — Represents the ionized molecule, indicating molecular weight.
(B) Base Peak — Represents the heaviest fragment ion generated within the mass analyzer spectrum.
(C) m/z — Represents the exact ratio of magnetic field strength to the z-axis coordinate.
(D) Fragmentation Pattern — Represents a unique spectrum dictated solely by injector temperature.

89. An analyst is operating a Gas Chromatograph and notices that two critical pesticide peaks are co-eluting (overlapping). Which of the following adjustments would NOT be a competent way to improve their resolution?
(A) Systematically decreasing the column oven start temperature.
(B) Increasing the carrier gas flow rate past optimal limits.
(C) Installing a significantly longer capillary column system.
(D) Selecting an alternative stationary phase with different selectivity.

90. Which of the following classes of compounds is generally unsuitable for direct analysis by standard Reversed-Phase HPLC without specialized techniques (e.g., derivatization or refractive index detection)?
(A) Polyphenols and flavonoids.
(B) Simple aliphatic sugars.
(C) Water-soluble B vitamins.
(D) Aromatic free amino acids.

91. In Flame Atomic Absorption Spectroscopy (FAAS), which gas mixture produces the hottest flame, suitable for refractory elements like Aluminum and Vanadium?
(A) Nitrous Oxide-Acetylene
(B) Air-Acetylene
(C) Air-Propane
(D) Argon-Hydrogen

92. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Graphite Furnace AAS (GFAAS) is generally preferred over Flame AAS (FAAS) for determining trace amounts of lead in drinking

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water.
Reason (R): GFAAS consumes much less sample and traps the atom cloud in the optical path for a longer period, resulting in limits of detection that are 100 to 1000 times lower than FAAS.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

93. Which of the following statements is correct regarding plasma generation in ICP-OES?
(A) The plasma is ignited by combusting a nitrous oxide and acetylene mixture.
(B) Solid food sample powders are introduced directly into the central plasma core.
(C) Plasma temperatures in the system are restricted to a maximum of 3000 Kelvin.
(D) An RF magnetic field ionizes argon gas to create high-temperature plasma.

94. Given below are statements regarding interferences in ICP-MS:
I. Isobaric interferences occur when isotopes of different elements have the same nominal mass.
II. Polyatomic interferences (e.g., $^{40}Ar^{35}Cl^{+}$ overlapping with $^{75}As^{+}$) can complicate analysis.
III. Collision/Reaction cells are often used to reduce polyatomic interferences.
IV. ICP-MS suffers from severe chemical interferences in the plasma, similar to low-temperature flames.
Which of the above statements are correct?
(A) I, II, and III
(B) II, III, and IV
(C) I, II, and IV
(D) I, III, and IV

95. In the context of Atomic Absorption Spectroscopy, what is the precise definition of "atomization"?
(A) The physical excitation of ground-state valence electrons to high energy levels.
(B) Converting sample analytes into free, ground-state gas-phase atoms.
(C) The thermal splitting of heavy target atoms into subatomic particles.
(D) The complete ionization of elements using a standard hollow cathode lamp.

96. Match the heavy metals listed in List I with their primary toxicological concerns typically monitored in food in List II:
List I: (Heavy Metals)
P. Lead (Pb)
Q. Mercury (Hg)
R. Cadmium (Cd)
S. Arsenic (As)
List II: (Toxicological Concerns)
I. Predominantly affects the kidneys and causes bone demineralization (Itai-itai disease)
II. Neurotoxic; accumulates heavily in predatory marine fish
III. Neurotoxic; associated with impaired cognitive development in children; common in old plumbing
IV. Carcinogenic; highly problematic in rice and groundwater
(A) P-III, Q-II, R-I, S-IV
(B) P-II, Q-III, R-IV, S-I
(C) P-I, Q-IV, R-III, S-II
(D) P-III, Q-I, R-II, S-IV

97. Which of the following is an incorrect pair regarding spectroscopic interferences?
(A) Ionization Interference (AAS) — Addressed by lowering the flame temperature to absolute zero
(B) Matrix Interference — Addressed by using the method of standard additions
(C) Chemical Interference (AAS) — Addressed by adding a releasing agent (e.g., Lanthanum for Calcium analysis)
(D) Isobaric Interference (ICP-MS) — Addressed by selecting an alternative isotope for measurement

98. A laboratory is analyzing agricultural soil and the crops grown in it to profile a wide range of elements, from highly abundant macro-elements (Ca, Mg) to ultra-trace toxic elements (Cd, As). To streamline the workflow and avoid multiple sample dilutions, which instrument with a wide dynamic linear range is best suited?
(A) Flame Atomic Absorption Spectrometry analytical setup.
(B) Standard double-beam UV-Visible Spectrophotometer.
(C) Inductively Coupled Plasma Optical Emission Spectrometry.
(D) Gas Chromatography with Flame Ionization Detection.

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99. Given below are two statements regarding NIR calibration models:
Statement I: Developing an NIR calibration model requires analyzing a large, diverse set of samples using both NIR and a trusted reference method (e.g., Soxhlet for fat).
Statement II: Once an NIR instrument is calibrated for moisture in wheat, that exact model can be seamlessly used without modification to measure moisture in cheese.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

100. A food manufacturing plant wants to measure the protein and fat content of incoming raw milk continuously inline. Which technology provides the most rapid, non-destructive monitoring capability suitable for inline integration?
(A) High Performance Liquid Chromatography (HPLC)
(B) Atomic Absorption Spectroscopy (AAS)
(C) Enzyme-Linked Immunosorbent Assay (ELISA)
(D) Near Infrared Reflectance (NIR) Spectroscopy

101. Which of the following statements about quantitative Nuclear Magnetic Resonance (qNMR) is incorrect?
(A) The peak resonance area is directly proportional to the number of nuclei.
(B) qNMR requires external calibration curves from identical reference standards.
(C) qNMR is a primary ratio method, allowing use of non-identical internal standards.
(D) It is increasingly used to assess olive oil purity and food matrix authenticity.

102. What is the effect of increasing the external magnetic field strength (B0) in an NMR spectrometer?
(A) It decreases energy level separation, reducing chemical shift dispersion.
(B) It physically converts non-magnetic 12C nuclei into active nuclei.
(C) It increases spin-state population differences, boosting sensitivity.
(D) It shifts the absorption spectrum from radio to ultraviolet wavelengths.

103. Which of the following is a correct pair regarding chemometrics used with spectroscopy?
(A) PCA — A supervised classification technique that requires pre-defined groups.
(B) LDA — An unsupervised exploratory technique used solely for noise reduction.
(C) Baseline Correction — A statistical test used to determine atomic weight values.
(D) PLS — A regression method correlating spectral data to a target variable.

104. A batch of premium Manuka honey is suspected of being heavily adulterated with high-fructose corn syrup (HFCS). As a food authenticity expert, which technique would you employ to most definitively profile the isotopic and structural sugar composition to prove adulteration?
(A) High-Resolution NMR Spectroscopy.
(B) Flame Atomic Absorption Spectroscopy.
(C) Enzyme-Linked Immunosorbent Assay.
(D) Western Blot Electrophoresis.

105. Which of the following elements are generally poorly detected or impossible to measure using standard flame Atomic Absorption Spectroscopy (AAS)?
(A) Transition metal elements.
(B) Halogens and non-metals.
(C) Alkali metal elements.
(D) Alkaline earth metals.

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106. In Fourier Transform Infrared (FTIR) spectroscopy using an Attenuated Total Reflectance (ATR) accessory, which of the following materials is commonly used for the ATR crystal?
(A) Sodium chloride salt crystal.
(B) Diamond or Zinc Selenide crystal.
(C) Standard optical quartz glass.
(D) Polymethyl methacrylate polymer.

107. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): FTIR-ATR is an official, rapid method for determining the trans fat content in edible oils and fats.
Reason (R): Trans double bonds exhibit a unique, isolated absorption band in the FTIR spectrum around 966 cm^{-1} (C-H out-of-plane deformation),

which is absent in cis double bonds.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

108. Which of the following statements is correct regarding chromophores in UV-Visible Spectrophotometry?
(A) Saturated alkanes represent excellent UV chromophores because they absorb intensely in the visible region.
(B) Auxochromes are identical to classic chromophores and absorb light completely independently of them.
(C) A chromophore is the molecular part responsible for UV absorption, often containing conjugated double bonds.
(D) The presence of a chromophore in a molecule always forces it to appear blue to the human visual system.

109. Given below are statements regarding essential components of a dual-beam UV-Vis spectrophotometer:
I. Light source (e.g., Tungsten and Deuterium lamps)
II. Beam splitter or chopper
III. Hollow cathode lamp
IV. Reference and sample cuvette compartments
Which of the above statements are correct?
(A) I, II, and IV
(B) I, II, and IV
(C) II, III, and IV
(D) I, III, and IV

110. In UV-Vis spectroscopy, what does the term "bathochromic shift" precisely mean?
(A) A shift of the absorption maximum to a shorter wavelength (blue shift).
(B) An increase in the absorption intensity (hyperchromic effect).
(C) A shift of the absorption maximum to a longer wavelength (red shift).
(D) A decrease in the absorption intensity (hypochromic effect).

111. Match the FTIR spectral regions listed in List I with their typical assignments in List II:
List I: (Spectral Regions)
P. 4000 - 2500 cm^{-1}
Q. 2500 - 2000 cm^{-1}
R. 2000 - 1500 cm^{-1}
S. 1500 - 400 cm^{-1}
List II: (Assignments)
I. Double bond region (C=O, C=C)
II. Fingerprint region (complex bending vibrations)
III. Single bond stretching of hydrogen (O-H, N-H, C-H)
IV. Triple bond region (C≡C, C≡N)
(A) P-III, Q-IV, R-I, S-II
(B) P-I, Q-II, R-III, S-IV
(C) P-III, Q-I, R-IV, S-II
(D) P-II, Q-III, R-I, S-IV

112. Which of the following represents an incorrect pair regarding the electromagnetic spectrum used in UV-Vis?
(A) Far UV spectral region — 10 to 200 nm
(B) Near UV spectral region — 200 to 400 nm
(C) Visible light spectrum — 400 to 750 nm
(D) Near Infrared region — 50 to 100 nm

113. A dairy processing plant suspects that incoming raw milk has been economically adulterated with urea and cheap maltodextrin. To simultaneously detect both adulterants rapidly before unloading the tanker, which technique is most practical and commonly used at dairy reception docks?
(A) FTIR Spectroscopy (often combined with milk analyzers)
(B) Transmission Electron Microscopy
(C) Traditional Kjeldahl and Soxhlet analyses
(D) Polymerase Chain Reaction

114. Given below are two statements regarding electron microscopy:
Statement I: In TEM, the image is formed by electrons that pass through the specimen.
Statement II: In SEM, the image is formed by secondary electrons or backscattered electrons ejected from the specimen's surface.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

115. A food scientist is developing a novel nano-emulsion to encapsulate vitamins. They need

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to directly visualize the internal structure and precisely measure the size of these 50-nanometer vesicles. Which instrument provides the best direct visualization?
(A) Transmission Electron Microscopy (TEM)
(B) Light Microscope with a 100x oil immersion objective
(C) Near Infrared (NIR) Spectroscopy
(D) Inductively Coupled Plasma (ICP)

116. Which of the following statements about SEM sample preparation is incorrect?
(A) Biological samples often require fixation and dehydration to survive the high vacuum of the SEM chamber.
(B) Critical Point Drying is frequently used to remove moisture without collapsing the delicate surface structures.
(C) Sputter coating with gold or platinum is routinely performed on food samples prior to SEM imaging.
(D) Non-conductive samples must remain uncoated to prevent distortion of the image by metallic artifacts.

117. What is the cause-and-effect rationale for coating non-conductive food samples with gold before Scanning Electron Microscopy (SEM)?
(A) Cause: Electrons easily pass straight through non-conductive materials. Effect: Metallic coating blocks transmission.
(B) Cause: Non-conductive samples accumulate static charge. Effect: Coating provides a ground path, preventing charging.
(C) Cause: The high vacuum forces the sample to freeze. Effect: Gold coating insulates the sample from temperature drops.
(D) Cause: Non-conductive food specimens lack natural color. Effect: Gold coating adds reflective tints for color imaging.

118. Which of the following is a correct pair regarding artifacts in microscopy?
(A) Photobleaching (Fluorescence) — Represents improved imaging resolution during exposure.
(B) Knife marks (TEM) — Represents naturally occurring structural fibers in plant walls.
(C) Charging artifact (SEM) — Appears as bright, distorted areas from electron buildup.
(D) Spherical aberration (Optical) — Ensures all light rays converge perfectly at a focal point.

119. A food technologist is formulating a mayonnaise and wants to evaluate the stability of the oil-in-water emulsion by observing the droplet size distribution and potential flocculation over time in its natural hydrated state. Which microscopy technique is best suited?
(A) High Vacuum Scanning Electron Microscopy (SEM)
(B) Transmission Electron Microscopy (TEM)
(C) X-ray Crystallography
(D) Confocal Laser Scanning Microscopy (CLSM)

120. Which of the following materials or sample types is generally unsuitable for direct imaging by standard Transmission Electron Microscopy (TEM) without extensive physical modification?
(A) A 2-millimeter thick slice of whole raw beef
(B) A suspension of isolated bacteriophages
(C) Purified protein macromolecules
(D) Ultra-thin (70 nm) sections of fixed plant tissue

121. In fluorescence microscopy used for assessing microbial viability, the LIVE/DEAD BacLight stain is commonly used. Which two fluorophores comprise this kit?
(A) Methylene Blue and Crystal Violet
(B) SYTO 9 and Propidium Iodide (PI)
(C) Fluorescein and Rhodamine
(D) Acridine Orange and DAPI

122. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Confocal Laser Scanning Microscopy (CLSM) can produce sharp images of structures located deep within a thick, intact food specimen.
Reason (R): CLSM uses a physical pinhole aperture placed in front of the detector to strictly eliminate out-of-focus light from above and below the focal plane.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

123. Which of the following statements correctly identifies the function of the "pinhole" in a Confocal Laser Scanning Microscope?

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(A) It blocks out-of-focus emission light from reaching the detector.
(B) It releases pressure safely from the high vacuum sample chamber.
(C) It filters the excitation laser beam to a single wavelength.
(D) It mechanically slices thick specimens into thin physical sections.

124. Given below are statements regarding Fluorescence Resonance Energy Transfer (FRET):
I. It is a distance-dependent physical process by which energy is transferred non-radiatively from an excited donor fluorophore to an acceptor fluorophore.
II. It is used to measure distances and interactions between molecules at the nanometer scale.
III. It only occurs if the emission spectrum of the donor overlaps with the excitation spectrum of the acceptor.
IV. It is routinely used to quantify bulk moisture content in grain silos.
Which of the above statements are correct?
(A) I, II, and III
(B) II, III, and IV
(C) I, II, and IV
(D) I, III, and IV

125. In the context of fluorescence spectroscopy and microscopy, what is the definition of the "Stokes shift"?
(A) The motorized shifting of the microscope stage during automatic z-stack acquisition.
(B) The time delay between initial photon absorption and subsequent fluorescent emission.
(C) The direct conversion of fluorescent emission light into localized sample heat energy.
(D) The wavelength difference between absorption and emission maxima of a fluorophore.

126. Match the specific fluorescent stains listed in List I with their specific biochemical targets in food microscopy in List II:
List I: (Fluorescent Stains)
P. Nile Red
Q. Fast Green FCF
R. Calcofluor White
S. FITC (Fluorescein isothiocyanate)
List II: (Biochemical Targets)
I. Proteins (covalently binds to amino groups)
II. Neutral lipids (fat droplets)
III. Cellulose and chitin (plant walls/fungi)
IV. Non-covalent protein counterstain
(A) P-II, Q-IV, R-III, S-I
(B) P-I, Q-II, R-III, S-IV
(C) P-II, Q-I, R-IV, S-III
(D) P-III, Q-IV, R-II, S-I

127. Which of the following represents an incorrect pair regarding light sources and their corresponding microscopy techniques?
(A) Tungsten-halogen lamp — Brightfield optical microscopy
(B) Hollow Cathode Lamp — Transmission Electron Microscopy (TEM)
(C) Mercury or Xenon arc lamp — Epifluorescence microscopy
(D) Lasers (e.g., Argon, Helium-Neon) — Confocal Laser Scanning Microscopy (CLSM)

128. Researchers are investigating a persistent Pseudomonas biofilm formation on stainless steel dairy equipment. They need to visualize the 3D architecture of the living biofilm, specifically mapping the extracellular polymeric substance (EPS) matrix and the embedded bacterial cells. Which instrument and staining approach is most suitable?
(A) SEM coupled with heavy metal contrast staining.
(B) HPLC analysis of wash water after biofilm rinsing.
(C) NIR spectroscopy scan of the flat steel surface.
(D) CLSM using multiple specific fluorescent probes.

129. Given below are two statements regarding ELISA:
Statement I: Direct ELISA is generally faster than Indirect ELISA because it uses only one antibody (which is enzyme-conjugated).
Statement II: Indirect ELISA offers higher sensitivity than Direct ELISA because multiple labeled secondary antibodies can bind to a single primary antibody, amplifying the signal.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is

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incorrect.
(D) Statement I is incorrect and Statement II is correct.

130. To monitor legal compliance, a laboratory must routinely test pasteurized milk for trace levels of Aflatoxin M1. Due to the high sample throughput required and the small molecular size of the toxin, which assay format is most practically applied?
(A) Direct Sandwich ELISA
(B) Transmission Electron Microscopy
(C) Competitive ELISA
(D) Real-Time PCR

131. Which of the following statements about cross-reactivity in ELISA is incorrect?
(A) High cross-reactivity is desirable for designing highly specific allergen tests.
(B) Cross-reactivity occurs when an antibody binds to antigens other than the target.
(C) It represents a primary cause of false-positive results in standard safety tests.
(D) Using monoclonal antibodies reduces the risk of cross-reactivity in diagnostic runs.

132. What is the cause-and-effect relationship regarding the addition of a chromogenic substrate (e.g., TMB) in the final step of an ELISA?
(A) Cause: Substrate interacts with antigen. Effect: The antigen shifts color.
(B) Cause: Substrate reacts with blocking buffer. Effect: Well becomes transparent.
(C) Cause: Substrate binds to the plastic plate. Effect: Well walls dissolve.
(D) Cause: Detection enzyme oxidizes substrate. Effect: A colored product forms.

133. Which of the following is a correct pair regarding the components of a Lateral Flow Immunoassay and their functions?
(A) Sample Pad — Holds the active test lines where colors physically form and are read.
(B) Conjugate Pad — Holds dried, labeled antibodies that bind the target analyte.
(C) Nitrocellulose Membrane — Acts as an impermeable block stopping capillary flow.
(D) Absorbent Pad — Releases starting buffers to initiate capillary flow reactions.

134. A biotech company is designing a new rapid test strip for field inspectors to detect Salmonella in wash water. The inspectors need a definitive "Yes/No" visual result within 15 minutes without any power source. Which core technology must the company utilize?
(A) ICP-MS analytical system.
(B) Quantitative Real-Time PCR.
(C) Lateral Flow Immunoassay.
(D) MALDI-TOF Mass Spectrometry.

135. Which of the following is NOT a factor that typically decreases the amplification efficiency of a PCR reaction?
(A) The presence of humic acids from soil in the DNA extract
(B) High concentrations of salts like NaCl or KCl in the sample
(C) Degradation of the template DNA due to extensive food processing (e.g., canning)
(D) Using highly purified, nuclease-free water to prepare the master mix

136. In Real-Time PCR (qPCR), what does the Threshold Cycle (Ct or Cq) value represent?
(A) The cycle number where fluorescence signal crosses background threshold.
(B) The specific thermal temperature where 50% of target DNA is denatured.
(C) The maximum fluorescent signal intensity achieved during the plateau phase.
(D) The total elapsed duration taken to complete forty standard thermal cycles.

137. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): TaqMan probes provide higher specificity in Real-Time PCR compared to SYBR Green dye.
Reason (R): SYBR Green binds non-specifically to any double-stranded DNA, including primer-dimers, whereas TaqMan probes hybridize only to a specific target sequence between the forward and reverse primers.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

138. Which of the following statements is correct regarding the limitations of DNA barcoding for food authenticity?
(A) It entirely useless for differentiating closely

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related fish species.
(B) Thermal processing degrades DNA, blocking barcode amplification.
(C) It easily quantifies specific meat percentages in complex mixed foods.
(D) It strictly requires target organisms to be alive during test runs.

139. Given below are statements regarding Next-Generation Sequencing (NGS) and Metagenomics in food safety:
I. NGS can sequence millions of DNA fragments simultaneously.
II. Targeted 16S rRNA metagenomics is used to profile bacterial communities in fermented foods.
III. NGS requires the target pathogens to be isolated and cultured on agar plates prior to sequencing.
IV. Metagenomics can help identify unculturable food spoilage microorganisms.
Which of the above statements are correct?
(A) I, II, and III
(B) I, II, and IV
(C) II, III, and IV
(D) I, III, and IV

140. In Hyperspectral Imaging, what is the definition of a "hypercube"?
(A) The physical white-light calibration standard used to balance spectra before scanning.
(B) The specialized cryogenic freezing chamber used to prepare sample slices.
(C) A 3D dataset containing two spatial dimensions and one spectral dimension.
(D) A mathematical algorithm utilized to compress raw spatial image sizes.

141. Match the Electronic Tongue (E-tongue) sensing principles listed in List I with their descriptions in List II:
List I: (Sensing Principles)
P. Potentiometry
Q. Voltammetry
R. Impedance spectroscopy
S. Optical sensing
List II: (Descriptions)
I. Measures the current produced by the oxidation/reduction of analytes at varying potentials
II. Measures the voltage difference between a working and reference electrode at zero current
III. Measures colorimetric changes in a sensor array reacting to liquid samples
IV. Measures opposition to alternating current flow across a range of frequencies
(A) P-II, Q-I, R-IV, S-III
(B) P-I, Q-II, R-III, S-IV
(C) P-II, Q-IV, R-I, S-III
(D) P-IV, Q-I, R-II, S-III

142. Which of the following represents an incorrect pair regarding analytical targets and food fraud techniques?
(A) Melamine in milk — Detected via HPLC or GC-MS (nitrogen adulteration)
(B) Sudan Red in spices — Detected via HPLC-UV/Vis (illegal dye adulteration)
(C) Horse meat in beef patties — Detected definitively via UV-Visible Spectrophotometry
(D) High Fructose Corn Syrup in Honey — Authenticated via stable isotope ratio mass spectrometry (IRMS) or NMR

143. Regulatory authorities suspect that a premium brand of "100% pure Atlantic Cod" is systematically substituting its product with cheaper farmed Pangasius. To obtain unassailable legal evidence of the exact species origin of these fillets, which technique should the forensic laboratory use?
(A) Near Infrared (NIR) Spectroscopy
(B) DNA Barcoding (sequencing the COI gene)
(C) Electronic Nose (E-nose)
(D) Inductively Coupled Plasma Mass Spectrometry (ICP-MS)

144. Given below are two statements regarding Time-of-Flight (TOF) Mass Spectrometry:
Statement I: In a TOF analyzer, all ions are accelerated by the same electric field, meaning they all receive the same kinetic energy.
Statement II: Consequently, heavier ions travel through the flight tube faster than lighter ions and reach the detector first.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

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145. A snack food manufacturer wants to automate the detection of oxidative rancidity in potato chips during shelf-life studies. Which sensor technology is theoretically best suited to mimic human olfaction and detect the complex volatile profile of lipid oxidation?
(A) Electronic Nose
(B) Electronic Tongue
(C) High-Performance Liquid Chromatography
(D) Enzyme-Linked Immunosorbent Assay

146. Which of the following statements about Hyperspectral Imaging (HSI) data processing is incorrect?
(A) HSI processing requires tools like Principal Component Analysis.
(B) Chemometric models are applied to correlate spectra with parameters.
(C) HSI outputs single numerical values, requiring no image analysis.
(D) HSI generates large datasets, requiring immense processing power.

147. What is the cause-and-effect principle behind Matrix-Assisted Laser Desorption/Ionization (MALDI)?
(A) Cause: Matrix absorbs laser pulses. Effect: Matrix vaporizes, ionizing intact analytes.
(B) Cause: High-energy electron bombardment. Effect: Analyte biomolecules shatter completely.
(C) Cause: High voltage is applied to a liquid spray. Effect: Droplets evaporate, leaving ions.
(D) Cause: Sample is heated in a graphite furnace to 2000°C. Effect: Complete atomization occurs.

148. Which of the following is a correct pair regarding authenticity markers and their analytical technique?
(A) TEM — Evaluates total bulk protein and nitrogen content.
(B) FAAS — Detects specific genetically modified DNA events.
(C) Real-Time PCR — Profiles total trans fatty acid isomer content.
(D) Chiral GC — Measures enantiomeric ratio of aroma compounds.

149. To comprehensively evaluate the overall sensory profile (both aroma and taste) of a complex fermented beverage objectively, a research institute integrates data from multiple sensor arrays. This approach combining an E-nose and an E-tongue is an example of:
(A) Stable isotope ratio mass spectrometry runs.
(B) Data fusion using multivariate chemometrics.
(C) High-throughput whole genome sequencing.
(D) Standard automated Sanger sequencing runs.

150. Which of the following is NOT a fundamental limitation of DNA-based authenticity techniques (like PCR or DNA barcoding) when applied to highly processed foods (e.g., refined oils, gelatin, distilled spirits)?
(A) DNA may be completely removed during filtration and refinement processes.
(B) Severe thermal processing shears and degrades DNA into fragments too small for standard primer amplification.
(C) DNA is highly stable and easily survives distillation and calcination temperatures exceeding 300°C.
(D) Acid hydrolysis during processing can destroy the nucleic acid backbone.

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ANSWERS

1. (A) Separation of analytes based on partition between a liquid mobile phase and solid stationary phase.
High Performance Liquid Chromatography separates chemical components in a complex food mixture based on their differential partitioning between a liquid mobile phase and a solid stationary phase packed in a column. As the mobile phase carries the sample through, different analytes interact uniquely with the stationary phase, resulting in distinct migration rates and effective separation.

2. (A) Both A and R are true and R is the correct explanation of A.
Reversed-phase chromatography utilizes a non-polar stationary phase, such as octadecylsilane, combined with a polar mobile phase like water and acetonitrile. This specific arrangement allows for the highly efficient retention and resolution of polar to moderately polar compounds, including many water-soluble vitamins and amino acids, making it the most prevalent mode in routine food safety analyses.

3. (A) Capillary columns consist of a fused silica tube coated internally with a stationary phase thin film.
Capillary columns used in gas chromatography are constructed from high-purity fused silica tubes. The inner wall of these narrow tubes is coated with a very thin, uniform film of liquid or polymer stationary phase. This structural configuration provides exceptionally high resolution and separation efficiency for analyzing complex volatile mixtures, such as food aromas.

4. (C) I, II, and IV
Flame ionization detectors excel in detecting organic compounds by burning them in a hydrogen flame, generating measurable ions. Electron capture detectors are highly specific for halogenated compounds, which is crucial for testing organochlorine pesticide residues. Nitrogen-phosphorus detectors offer outstanding selectivity and sensitivity for pesticides containing nitrogen and phosphorus atoms in food matrices.

5. (B) The time elapsed between sample injection and the maximum elution peak response of a target analyte.
Retention time is the specific duration that elapses from the initial sample injection into the chromatographic system until the maximum concentration peak of a target compound reaches the detector. This characteristic parameter is highly reproducible under constant operational conditions and serves as a primary tool for the qualitative identification of analytes.

6. (A) P-III, Q-I, R-II, S-IV
Chromatography and spectroscopy serve diverse roles in food analysis. High performance liquid chromatography quantifies water-soluble vitamins, while gas chromatography profiles volatile fatty acids in oils. Atomic absorption spectroscopy determines toxic heavy metal contaminants. Nuclear magnetic resonance spectroscopy provides non-destructive structural characterization, verifying food authenticity and identifying chemical compounds without destroying the sample.

7. (D) Size Exclusion — Separation based strictly on analyte charge
Size exclusion chromatography separates molecules purely based on their physical size and hydrodynamic volume rather than their electrical charge. The stationary phase consists of porous beads that exclude larger molecules, allowing them to elute first, while smaller molecules penetrate the pores and elute later. Ion exchange chromatography separates analytes based on electrostatic charges.

8. (B) III → II → I → IV
Analyzing pesticide residues begins with extracting and cleaning up the food sample using specialized protocols to remove interfering matrix components. The cleaned extract is injected into a capillary column for high-resolution separation. The separated analytes then undergo thermal ionization in the mass spectrometer, followed by mass analysis to generate unique fragmentation patterns.

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9. (C) Statement I is correct and Statement II is incorrect.
Triacylglycerols are large, polar, and non-volatile molecules that cannot undergo direct gas chromatography. Converting them into fatty acid methyl esters significantly increases their volatility and thermal stability, allowing smooth gas chromatographic separation. This chemical preparation routinely involves a saponification step to hydrolyze the ester bonds, followed by methylation using an acidic catalyst.

10. (B) Solid-Phase Microextraction (SPME) coupled with GC-MS
Solid-phase microextraction combined with gas chromatography-mass spectrometry is the ideal setup for volatile aroma compounds in wine. The microextraction fiber adsorbs volatile compounds from the sample headspace, concentrating them without using organic solvents. Subsequent thermal desorption in the gas chromatograph injector enables high-resolution separation and precise mass spectral identification of these trace components.

11. (A) Flame AAS typically offers lower detection limits (higher sensitivity) than Graphite Furnace AAS.
Graphite furnace atomic absorption spectroscopy provides significantly lower detection limits and higher sensitivity compared to standard flame systems. The graphite tube retains the atomized sample in the optical path for a much longer period, allowing a higher percentage of ground-state atoms to absorb light. In contrast, flame systems quickly disperse the sample.

12. (C) It eliminates all matrix interferences by instantly vaporizing the sample matrix without charring.
Utilizing a graphite furnace in atomic absorption spectroscopy allows for programmable heating steps that selectively dry, ash, and atomize the sample. This sequential thermal treatment effectively vaporizes and removes complex organic food matrices during the low-temperature pyrolytic stage before the high-temperature atomization step, drastically reducing chemical and background interferences during measurement.

13. (D) Argon Gas — The standard gas used to generate and sustain the high-temperature plasma
Argon gas is the universal standard used in inductively coupled plasma systems to generate and sustain the high-temperature plasma. The gas is subjected to an intense radiofrequency field, which ionizes the argon atoms and creates an stable, energetic plasma of up to ten thousand Kelvin, facilitating efficient atomization and ionization of elements.

14. (C) Inductively Coupled Plasma Mass Spectrometry (ICP-MS)
Inductively coupled plasma mass spectrometry is the most competent instrument for analyzing both ultra-trace toxic heavy metals and major minerals simultaneously. This technique offers an exceptionally wide linear dynamic range, allowing the quantitation of elements from parts-per-billion up to parts-per-million levels in a single run, while providing extremely high sensitivity and spectral resolution.

15. (B) Monosaccharides and free amino acids
Monosaccharides and free amino acids possess highly polar functional groups, such as hydroxyl, carboxyl, and amino groups, which form strong intermolecular hydrogen bonds. These interactions make them non-volatile and thermally unstable. Consequently, they cannot undergo gas chromatographic separation without initial chemical derivatization to replace active hydrogens with less polar, volatile silyl groups.

16. (D) 780 nm to 2500 nm
Near infrared reflectance spectroscopy utilizes electromagnetic radiation within the wavelength range of seven hundred and eighty nanometers to twenty-five hundred nanometers. This spectral region is highly valuable for the rapid, non-destructive analysis of food components, as it contains key vibrational overtone and combination bands of hydrogen-containing bonds like carbon-hydrogen and oxygen-hydrogen.

17. (A) Both A and R are true and R is the correct explanation of A.
Near infrared spectroscopy is a rapid, non-destructive technique widely deployed to measure moisture levels in grains. The primary physical basis of this analysis is the strong absorption of near infrared light by water molecules, which exhibit characteristic overtone and combination bands around fourteen hundred and nineteen hundred nanometers due to oxygen-hydrogen stretching vibrations.

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18. (C) NMR relies on the magnetic spin properties of specific atomic nuclei, such as 1H and 13C.
Nuclear magnetic resonance spectroscopy relies on the magnetic spin properties of specific atomic nuclei containing odd numbers of protons or neutrons, such as hydrogen-one and carbon-thirteen. When placed in a strong external magnetic field and exposed to radiofrequency radiation, these active nuclei absorb energy, providing highly detailed structural and quantitative food composition data.

19. (B) I, II, and IV
Fourier transform infrared spectroscopy generates a distinct spectral fingerprint based on the unique vibrational frequencies of molecular bonds. This enables rapid identification of adulteration in edible oils, such as mixing premium olive oil with cheaper alternatives. Attenuated total reflectance accessories simplify sample preparation, allowing direct, non-destructive analysis of both liquid and solid foods.

20. (D) The difference in resonant frequency of a nucleus relative to a reference standard.
Chemical shift represents the slight variation in the resonant frequency of a specific atomic nucleus compared to a standard reference compound, such as tetramethylsilane. This shift is caused by the localized magnetic shielding provided by surrounding electrons, which directly reflects the chemical environment and molecular structure surrounding the target nucleus.

21. (A) P-I, Q-II, R-III, S-IV
Analytical spectroscopy techniques are defined by distinct physical mechanisms. Ultraviolet-visible spectrophotometry measures electronic transitions in valence electrons. Fourier transform infrared spectroscopy detects molecular bond vibrational transitions. Nuclear magnetic resonance registers the magnetic spin transitions of atomic nuclei. Matrix-assisted laser desorption/ionization time-of-flight measures the travel time of generated ions in a high vacuum.

22. (C) N-H stretch — Low frequency peak around 600-800 cm^{-1}
Nitrogen-hydrogen stretching vibrations produce characteristic absorption bands in the high-frequency region of the infrared spectrum, typically appearing between thirty-three hundred and thirty-five hundred wavenumbers. This is similar to oxygen-hydrogen stretching frequencies. Low frequencies around six hundred to eight hundred wavenumbers do not represent nitrogen-hydrogen stretching vibrations, making that pairing chemically inaccurate.

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23. (A) III → II → IV → I
The fundamental light path in a conventional ultraviolet-visible spectrophotometer begins with the light source, which emits a broad spectrum of radiation. The light passes through a monochromator to select a specific, narrow wavelength. This monochromatic beam is directed through the sample cuvette, and the transmitted light is finally recorded by the detector.

24. (D) Statement I is incorrect and Statement II is correct.
The Beer-Lambert law states that absorbance is directly proportional to both the concentration of the absorbing chemical species and the physical light path length through the sample. Measuring absorbance at the wavelength of maximum absorption is the standard practice because it maximizes sensitivity and minimizes potential deviations from the linear concentration relationship.

25. (B) Trans double bonds and ester carbonyl stretching frequencies
Detecting vegetable fat adulteration in pure butter using Fourier transform infrared spectroscopy with attenuated total reflectance focuses on analyzing trans double bonds and ester carbonyl stretching frequencies. Vegetable fats and hydrogenated oils exhibit distinct spectral absorption bands in these regions, allowing quick detection and quantitative estimation of the adulterants.

26. (B) NIR is highly specific and can identify unknown molecular structures as easily as high-resolution NMR.
Near infrared spectroscopy is not a highly specific structural identification technique. Unlike high-resolution nuclear magnetic resonance, near infrared spectra consist of broad, heavily overlapping overtone and combination bands that are difficult to assign to specific atoms. Instead, it relies on complex chemometric calibration models built from primary reference analytical methods.

27. (A) An increase in the extent of molecular double-bond conjugation.
A bathochromic shift occurs when the absorption maximum of a food colorant shifts to a longer

wavelength, which is also called a red shift. This optical effect is primarily caused by an increase in the conjugation of double bonds within the molecule, which decreases the energy gap required for electronic transitions.

28. (C) TEM — Requires ultra-thin sample sections for electron transmission.
Transmission electron microscopy requires ultra-thin physical sections of the specimen, typically under one hundred nanometers in thickness. This sample thickness allows the high-energy electron beam to pass through the specimen and interact with its internal structures, forming a high-resolution image based on the density variations within the sample.

29. (D) Scanning Electron Microscopy (SEM)
Scanning electron microscopy is the ideal instrument for examining the three-dimensional surface morphology of microstructures like starch granules. This technique offers high magnification and an outstanding depth of field, utilizing a focused electron beam that scans the specimen surface to capture high-resolution topographical details and surface features.

30. (C) Measuring trace pesticide residues at parts-per-trillion (ppt) levels directly.
Standard proton nuclear magnetic resonance spectroscopy lacks the sensitivity required to detect trace components, such as pesticide residues, at parts-per-trillion levels directly in complex food matrices. It typically requires analyte concentrations in the millimolar or high micromolar range, whereas trace residue analysis is successfully performed using mass spectrometry coupled with chromatography.

31. (B) A high-energy beam of electrons emitted from a cathode
In transmission electron microscopy, a high-energy beam of electrons serves as the source of illumination. Generated by an electron gun using a heated tungsten filament or field emission cathode, these electrons are accelerated under high voltage and focused through electromagnetic lenses to penetrate and illuminate the ultra-thin biological sample.

32. (A) Both A and R are true and R is the correct explanation of A.
Transmission electron microscopy achieves significantly higher spatial resolution than scanning electron microscopy. The high-energy electron beam in transmission systems passes directly through ultra-thin specimens, capturing internal structural information at atomic scales. Conversely, scanning systems capture secondary electrons emitted from the surface, which inherently limits the maximum resolution of surface topography.

33. (A) Non-conductive food samples must be coated with conductive gold or carbon.
Conventional scanning electron microscopy operates under a high vacuum, meaning that non-conductive food specimens must be coated with a thin layer of conductive metal, such as gold or carbon. This coating prevents the accumulation of electrostatic charges on the sample surface, which would otherwise distort the electron beam and degrade the image.

34. (A) I, II, and IV
Fluorescence microscopy is a sensitive tool that detects light emitted at a longer wavelength after a sample absorbs excitation light. Specific fluorochromes like Nile Red stain neutral lipids, highlighting fat droplets in food emulsions. Additionally, autofluorescence occurs naturally in food components, such as riboflavin and collagen, facilitating direct visualization without staining.

35. (A) The immediate emission of light at a longer wavelength by a substance after absorbing radiation.
Fluorescence is defined as the immediate emission of electromagnetic radiation, typically visible light, by a substance that has absorbed light of a shorter wavelength and higher energy. The process occurs almost instantaneously, as excited electrons rapidly return to their ground state, releasing energy as a photon of longer wavelength.

36. (A) P-IV, Q-I, R-III, S-II
Microscopic techniques offer unique imaging features. Fluorescence microscopy utilizes dichroic mirrors and emission filters for targeted molecular visualization. Confocal laser scanning microscopy achieves optical sectioning using a spatial pinhole. Scanning electron microscopy delivers high depth-of-field surface images, while transmission electron microscopy reveals internal nanostructures within ultra-thin specimen sections.

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37. (B) FITC (Fluorescein isothiocyanate) — Heavy metal ions
Fluorescein isothiocyanate is a widely used fluorescent labeling reagent that specifically reacts with amine groups on proteins, rather than heavy metal ions. Fluorescent probes for heavy metal detection require specialized chelating structures. Stains such as Nile Red target lipids, Calcofluor White binds carbohydrates, and DAPI specifically labels double-stranded DNA.

38. (A) II → IV → III → I
Preparing biological food tissues for transmission electron microscopy involves a strict sequential protocol. The sample undergoes primary fixation with glutaraldehyde to preserve cellular structures. This is followed by dehydration through a graded ethanol series. The specimen is then embedded in a solid resin block before being cut into ultra-thin sections.

39. (A) Both Statement I and Statement II are correct.
Confocal laser scanning microscopy effectively eliminates out-of-focus light and glare from specimens thicker than the focal plane, yielding exceptionally sharp images. This optical filtering enables the non-destructive collection of a series of high-contrast two-dimensional optical sections at different depths, allowing for the precise three-dimensional reconstruction of complex food structures.

40. (A) Confocal Laser Scanning Microscopy (CLSM)
Confocal laser scanning microscopy is the ideal technique to study the spatial distribution of protein networks and fat globules in cheese. This method allows non-destructive imaging of thick, intact food samples by taking sequential optical sections. This avoids physical cutting, which can alter the delicate structural relationships of the sample.

41. (B) It uses an electron beam instead of a laser to excite the fluorophores.
Confocal laser scanning microscopy utilizes highly focused lasers as the excitation light source to induce fluorescence in target molecules, rather than an electron beam. The laser light scans the sample pixel by pixel, and the emitted light is filtered through a pinhole to generate high-resolution optical sections from deep within the specimen.

42. (B) It acts as a secondary fixative providing electron contrast to lipids.
Osmium tetroxide is a heavy metal compound used during transmission electron microscopy sample preparation. It functions as a secondary fixative that chemically reacts with and stabilizes unsaturated lipids in biological membranes. Additionally, osmium deposits introduce heavy metal atoms that provide excellent electron contrast, scattering electrons to reveal cellular and vesicular structures.

43. (A) Electron Microscope — Operates in a vacuum to prevent electron scattering.
Electron microscopes operate under a high vacuum to prevent the high-energy electron beam from colliding with gas molecules, which would scatter the electrons and disrupt the imaging path. Optical microscopes, in contrast, use glass lenses to focus visible light and do not require a vacuum, making them simpler but limited in resolution.

44. (C) Scanning Electron Microscopy (SEM)
Scanning electron microscopy is the most effective imaging tool to evaluate the flowability and agglomeration behavior of spray-dried milk powder. It delivers high-resolution, three-dimensional topographical images of individual powder particles, revealing surface roughness, shape, porosity, and inter-particle bridging, which are critical parameters for understanding powder flow and reconstitution properties.

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45. (D) The rapid photobleaching of fluorescent dyes under intense light excitation.
A major limitation of standard fluorescence microscopy is photobleaching, where fluorescent dyes or natural fluorophores undergo irreversible chemical destruction when exposed to intense excitation light. This photochemical reaction reduces the emission intensity over time, which can complicate prolonged observations and quantitative measurements of target molecules in food samples.

46. (C) The specific binding between an antigen and its corresponding antibody.
The fundamental biological basis of the Enzyme-Linked Immunosorbent Assay is the highly specific binding interaction between an antigen and its complementary antibody. This molecular recognition enables the precise detection and quantification of target proteins, toxins, or

allergens in complex food matrices, even when present in trace concentrations.

47. (A) Both A and R are true and R is the correct explanation of A.
Sandwich ELISA offers exceptional specificity for allergen detection in foods. This assay configuration requires the target antigen to bind simultaneously to an immobilized capture antibody and a labeled detection antibody. Consequently, the target molecule must possess at least two distinct binding sites, minimizing false positives caused by non-specific cross-reactivity.

48. (D) They are designed primarily for rapid, on-site qualitative screening.
Lateral flow immunoassays are rapid, paper-based diagnostic devices designed for on-site, qualitative or semi-quantitative screening of contaminants. They do not require specialized laboratory equipment, as the sample flows through capillary action across test lines, providing highly visual and easy-to-read results within a few minutes for field inspectors.

49. (D) I, II, III, and IV
A standard indirect ELISA protocol consists of coating the microtiter plate with the target antigen, followed by adding a blocking buffer to fill remaining unbound sites. The primary antibody binds the antigen, after which an enzyme-conjugated secondary antibody is introduced. Finally, adding a chromogenic substrate generates a measurable colorimetric signal.

50. (C) The highest serum dilution producing a detectable immune response.
Antibody titer is defined as the highest dilution of an antiserum or antibody sample that still produces a detectable, measurable immune response with its target antigen. This quantitative value reflects the concentration and binding activity of active antibodies present in the tested serum, serving as a measure of immunological potency.

51. (A) P-III, Q-IV, R-I, S-II
ELISA assays utilize distinct functional components. The microtiter plate acts as the solid support to immobilize targets. Bovine serum albumin serves as a blocking agent to reduce non-specific binding and background noise. Enzymes like horseradish peroxidase catalyze chemical reactions, converting chromogenic substrates into visible, colored products for quantitative spectrophotometric detection.

52. (D) Competitive ELISA — A higher concentration of analyte in the sample results in a stronger final color signal.
In a competitive ELISA, the final color signal intensity is inversely proportional to the concentration of the target analyte in the sample. A higher concentration of analyte competes more effectively with the labeled antigen for a limited number of antibody binding sites, resulting in fewer bound enzyme conjugates and a weaker signal.

53. (A) III → I → II → IV
Conducting a competitive ELISA for mycotoxins starts by coating the microtiter wells with specific antibodies. Unlabeled sample mycotoxins are added alongside enzyme-labeled mycotoxins, initiating competitive binding. A washing step removes any unbound molecules, after which a chromogenic substrate is added to measure the final color intensity, which is inversely proportional to toxin concentration.

54. (A) Both Statement I and Statement II are correct.
In lateral flow immunoassays, the appearance of a line at the control zone verifies that the sample has migrated correctly and the reagents are active. In a competitive assay format, the absence of a line at the test zone indicates a positive result, as the target analyte has blocked the antibody binding sites.

55. (D) Lateral Flow Immunoassay (LFIA) specific for peanut proteins
Lateral flow immunoassays specific for peanut proteins are the most practical tool for rapid, on-site cleaning verification. These test strips yield easy-to-read visual results in minutes without laboratory equipment, allowing sanitization teams to instantly confirm the presence or absence of trace allergen residues before beginning a new production run.

56. (A) PCR relies on an RNA polymerase to synthesize new DNA strands.
Polymerase chain reaction relies on a thermostable DNA polymerase, such as Taq polymerase, rather than an RNA polymerase to synthesize new DNA strands. This enzyme replicates DNA by adding complementary deoxynucleotide triphosphates

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to the three-prime end of hybridized primers, enabling the exponential amplification of the target sequence.

57. (B) It is highly thermostable and survives DNA denaturation temperatures.
Taq polymerase is universally used in standard polymerase chain reaction assays because of its remarkable thermostability. Extracted from the thermophilic bacterium Thermus aquaticus, this enzyme remains stable and active after exposure to the high temperatures, around ninety-five degrees Celsius, required to fully denature double-stranded DNA templates during thermal cycling.

58. (B) Extension — 72°C to allow polymerase synthesis of new DNA.
The extension phase of a standard polymerase chain reaction cycle is typically performed at seventy-two degrees Celsius. This temperature represents the thermodynamic optimum for Taq polymerase activity, enabling the rapid and accurate synthesis of new complementary DNA strands by extending the hybridized primers along the single-stranded DNA templates.

59. (A) Real-Time Quantitative PCR (qPCR) using specific fluorescent probes
Real-time quantitative polymerase chain reaction using sequence-specific fluorescent probes is the standard technique to quantify genetically modified soy percentages. This method monitors DNA amplification in real time during the exponential phase. By comparing amplification curves with reference standards, laboratories can precisely calculate the ratio of modified genes to total soy DNA.

60. (C) They have lower overall sensitivity, leading to possible false negatives.
A major limitation of lateral flow immunoassays compared to laboratory-based enzyme-linked immunosorbent assays is their lower overall analytical sensitivity. While outstanding for rapid screening, lateral flow devices may fail to detect low concentrations of target contaminants, increasing the risk of false-negative results that require confirmatory testing.

61. (D) Cytochrome c oxidase subunit I (COI) gene
The mitochondrial cytochrome c oxidase subunit I gene is the universally accepted DNA barcode region for animal species identification. This gene contains highly conserved regions for universal primer binding alongside sufficient sequence variation to accurately distinguish between closely related animal species, including fish, poultry, and mammal meat.

62. (A) Both A and R are true and R is the correct explanation of A.
Metagenomics serves as a robust approach for analyzing entire microbial communities in fermented foods without culturing. This technique bypasses traditional culture-dependent biases by directly extracting and sequencing total environmental DNA from the food sample, revealing the complete profile of both cultivable and uncultivable microorganisms involved in fermentation.

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63. (B) It combines imaging and spectroscopy for spatial and spectral data.
Hyperspectral imaging combines conventional digital imaging with spectroscopy, collecting both spatial and spectral data from a food specimen. This non-destructive technique generates a three-dimensional dataset where every pixel contains a complete spectrum, allowing for the precise mapping of chemical distribution, such as moisture and fat, across the food surface.

64. (C) I, II, and IV
Hyperspectral imaging systems capture contiguous, narrow spectral bands across a wide range, producing a complete spectrum for each pixel in the image. In contrast, multispectral systems measure a few discrete, widely spaced spectral bands. This makes multispectral imaging faster and less computationally demanding, while hyperspectral imaging provides vastly detailed chemical maps.

65. (A) Analysis of genetic material extracted directly from food samples.
Metagenomics is defined as the direct genomic analysis of the entire collection of microorganisms present in a sample, performed by extracting and sequencing total DNA directly from the food matrix. This culture-independent approach allows researchers to identify and characterize complex microbial communities, including uncultivable species, without isolating individual strains first.

66. (A) P-IV, Q-III, R-II, S-I
Molecular tools address diverse analytical needs in food safety. Quantitative real-time PCR precisely measures genetically modified DNA. DNA

barcoding identifies unknown tissue samples to the species level. Metagenomics profiles complex microbial communities in raw ingredients, while whole genome sequencing provides strain-level tracking of pathogens during outbreak investigations.

67. (A) Plants — 18S rRNA gene primarily
For plant species identification, the ribosome-binding eighteen-S ribosomal RNA gene is not the primary barcode. Plant DNA barcoding relies on plastid gene regions, specifically ribulose-bisphosphate carboxylase and maturase K. Animal barcoding utilizes the cytochrome c oxidase subunit I gene, bacteria are identified using sixteen-S ribosomal RNA, and fungi use the internal transcribed spacer.

68. (A) III → IV → II → I
Identifying food spoilage microbiota through metagenomic sequencing follows a structured pipeline. The process begins with total DNA extraction from the food sample, followed by library preparation and fragmentation. High-throughput sequencing platforms then generate millions of short sequence reads. Finally, bioinformatics tools assemble these reads and perform taxonomic assignment.

69. (C) Statement I is correct and Statement II is incorrect.
An electronic nose utilizes an array of non-specific chemical sensors that interact with volatile compounds, producing a collective response pattern or fingerprint. It does not separate or identify the individual chemical structures of each compound in the mixture, but relies on statistical pattern recognition algorithms to classify the overall aroma.

70. (C) Electronic Tongue
An electronic tongue is the most suitable sensor technology to monitor wine aging and astringency profiles objectively. This system uses an array of liquid-phase sensors that respond to dissolved taste compounds, mimicking the human gustatory system to register sourness, sweetness, bitterness, and complex mouthfeel properties like astringency.

71. (D) It identifies microorganisms by generating a unique profile of their DNA fragments.
MALDI-TOF mass spectrometry does not identify microorganisms by generating DNA profiles. Instead, this rapid technique analyzes intact proteins, particularly highly abundant ribosomal proteins, from whole microbial cells. The resulting mass spectrum is compared against reference databases of protein profiles to achieve fast, precise species-level identification of bacteria and fungi.

72. (A) It absorbs laser energy to vaporize and ionize analytes intact.
The chemical matrix in MALDI-TOF analysis is essential for co-crystallizing with the analyte. Upon exposure to ultraviolet laser pulses, the matrix absorbs the laser energy, rapidly vaporizing and facilitating the gentle desorption and ionization of large biomolecules, such as proteins, without causing extensive thermal degradation or fragmentation.

73. (B) MOS sensors — Measure changes in electrical conductivity from volatile interactions.
Metal oxide semiconductor sensors are standard components in electronic nose systems. When volatile organic compounds interact with the heated metal oxide surface, a reversible oxidation or reduction reaction occurs, leading to a measurable change in the electrical conductivity of the sensor, which is processed to identify the overall aroma profile.

74. (B) MALDI-TOF Mass Spectrometry
MALDI-TOF mass spectrometry is the modern gold standard for identifying isolated bacterial colonies like Listeria monocytogenes within minutes. This technique vaporizes and analyzes ribosomal proteins directly from a single colony on an agar plate, generating a mass spectral fingerprint that is instantly matched against a database for definitive identification.

75. (A) It generates large datasets requiring complex image processing.
A major limitation of hyperspectral imaging is the generation of massive, highly complex datasets containing hundreds of spectral bands for each spatial pixel. Processing these data cubes requires specialized chemometric tools, sophisticated multivariate calibration models, and substantial computational power, which can hinder real-time implementation on fast-moving food production lines.

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76. (C) Fluorescence Detector (FLD)
Riboflavin exhibits strong natural fluorescence, allowing for highly sensitive and selective detection using a fluorescence detector during high performance liquid chromatography. This detector excites the analyte at a specific wavelength and measures the emitted light at a longer wavelength, significantly reducing interference from non-fluorescent co-eluting food components.

77. (A) Both A and R are true and R is the correct explanation of A.
Amino acids generally lack strong chromophores or fluorophores, making direct detection using ultraviolet or fluorescence instruments highly difficult. Consequently, pre-column or post-column derivatization is routinely performed using specific reagents to introduce light-absorbing or fluorescent chemical groups, enabling highly sensitive and selective chromatographic quantitation of amino acids.

78. (C) Immunoaffinity columns are used for sample cleanup and concentration.
Analyzing mycotoxins via high performance liquid chromatography relies heavily on immunoaffinity columns for sample cleanup and selective concentration. These columns contain specific monoclonal antibodies that bind target mycotoxins while allowing matrix components to pass through, ensuring clean extracts and minimizing background noise before injection into the chromatographic system.

79. (B) I, II, and IV
The QuEChERS method is a widely accepted sample preparation technique for pesticide residues in foods. It involves extracting analytes into an organic solvent, aided by salts like magnesium sulfate that induce phase separation and remove water. Dispersive solid phase extraction serves as a critical cleanup step, removing interfering lipids, pigments, and organic acids.

80. (D) Varying the mobile phase composition during the chromatographic run.
Gradient elution is defined as the systematic variation of the mobile phase composition during a chromatographic run. By gradually increasing the solvent strength, such as increasing the organic solvent ratio, this method accelerates the elution of strongly retained compounds, improving resolution, sharpening peaks, and reducing the overall analysis time.

81. (A) P-III, Q-IV, R-I, S-II
Chromatographic detectors correspond to distinct molecular properties. Diode array detectors measure ultraviolet absorption across multiple wavelengths. Refractive index detectors act as universal sensors for compounds lacking chromophores, such as sugars. Electron capture detectors target electronegative compounds like organochlorine pesticides, and flame photometric detectors selectively measure sulfur or phosphorus-containing compounds.

82. (C) Aminopropyl — Strictly non-polar, size-exclusion phase
Aminopropyl bonded phases are not size-exclusion phases. Instead, they serve as polar stationary phases utilized in normal-phase chromatography, hydrophilic interaction liquid chromatography, or weak anion exchange applications. Standard reversed-phase separations use non-polar octadecylsilane or octylsilane columns, while unbonded silica represents the classic stationary phase for normal-phase separations.

83. (A) Electron Capture Detector (ECD)
An electron capture detector is the most sensitive and selective option for detecting organochlorine pesticide residues in complex food matrices. This gas chromatography detector contains a radioactive beta-emitter that generates a steady current, which drops sharply when highly electronegative halogenated pesticide molecules pass through, providing outstanding trace sensitivity.

84. (C) Statement I is correct and Statement II is incorrect.
The response of a flame ionization detector is directly proportional to the number of carbon atoms present in the organic analyte as they burn in a hydrogen flame. However, this detector exhibits virtually no sensitivity to water and carbon dioxide, allowing for the analysis of aqueous food extracts without system interference.

85. (B) GC-MS
Gas chromatography coupled with mass spectrometry is the standard instrument to profile volatile esters in strawberry flavor. The chromatograph separates the complex mixture of volatile compounds based on their interaction with a capillary column, while the mass spectrometer provides detailed molecular fragmentation

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patterns to definitively identify and quantify each component.

86. (C) ESI is the standard method to ionize volatile analytes in GC-MS.
Electrospray ionization is not the standard ionization method in gas chromatography-mass spectrometry, as it is designed for liquid-phase analysis. Instead, gas chromatography-mass spectrometry systems utilize gas-phase ionization techniques such as electron impact ionization for hard fragmentation or chemical ionization for softer, molecular ion preservation of volatile analytes.

87. (D) Applying combined DC and RF oscillating fields to four parallel metal rods.
Separation of ions in a quadrupole mass analyzer is achieved by applying a combination of direct current and radiofrequency oscillating electrical fields to four parallel metal rods. This electrical field allows only ions of a specific mass-to-charge ratio to maintain stable trajectories and reach the detector, filtering out all others.

88. (A) Molecular Ion Peak (M^+) — Represents the ionized molecule, indicating molecular weight.
The molecular ion peak represents the intact analyte molecule that has lost a single electron during ionization, providing direct information about its molecular weight. In contrast, the base peak represents the most intense peak in the spectrum, while mass-to-charge ratio defines the fundamental physical parameter used for ion separation.

89. (B) Increasing the carrier gas flow rate past optimal limits.
Increasing the carrier gas flow rate past its optimal linear velocity degrades separation efficiency and decreases chromatographic resolution, as described by the van Deemter equation. Effective methods to resolve overlapping peaks include lowering the column temperature ramp rate, using a longer capillary column, or selecting a stationary phase with different chemical selectivity.

90. (B) Simple aliphatic sugars.
Simple aliphatic sugars are highly polar, hydrophilic molecules that exhibit poor retention on standard non-polar reversed-phase stationary phases, eluting almost immediately. Furthermore, they lack UV-absorbing chromophores, making them unsuitable for standard ultraviolet detectors. Consequently, their analysis requires specialized techniques like hydrophilic interaction chromatography combined with refractive index detection.

91. (A) Nitrous Oxide-Acetylene
A nitrous oxide-acetylene gas mixture is used in flame atomic absorption spectroscopy to produce the hottest flame, reaching temperatures around twenty-nine hundred degrees Celsius. This high temperature provides the thermal energy required to dissociate refractory oxides and atomize challenging elements, such as aluminum, silicon, and vanadium, which do not atomize in cooler flames.

92. (A) Both A and R are true and R is the correct explanation of A.
Graphite furnace atomic absorption spectroscopy is preferred for trace lead analysis due to its exceptional sensitivity. This electrothermal atomization technique requires minimal sample volumes and keeps the atomized sample in the optical light path for a longer duration compared to flame systems, resulting in detection limits up to one thousand times lower.

93. (D) An RF magnetic field ionizes argon gas to create high-temperature plasma.
Plasma generation in inductively coupled plasma systems involves applying an intense radiofrequency magnetic field through an induction coil to ionize argon gas. This process creates a high-temperature plasma, reaching temperatures up to ten thousand Kelvin, which is maintained without combustion and facilitates highly efficient atomization and ionization of injected liquid samples.

94. (A) I, II, and III
Inductively coupled plasma mass spectrometry is subject to isobaric and polyatomic interferences, which occur when different isotopes or plasma-formed molecular species share the same mass-to-charge ratio as the target analyte. Collision or reaction cells are standard tools used to dissociate or deflect these interfering polyatomic ions before they reach the mass analyzer.

95. (B) Converting sample analytes into free, ground-state gas-phase atoms.
Atomization is defined as the chemical and physical process of converting a liquid or solid sample into free, ground-state gas-phase

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atoms. In atomic absorption spectroscopy, this critical transformation is achieved using high temperatures from a flame or graphite furnace, allowing the resulting free atoms to absorb characteristic analytical light wavelengths.

96. (A) P-III, Q-II, R-I, S-IV
Heavy metals present distinct toxicological concerns in food safety monitoring. Lead is a neurotoxin that impairs cognitive development in children. Mercury accumulates in predatory marine fish, posing neurological risks. Cadmium causes kidney damage and bone demineralization, while arsenic is a potent carcinogen that frequently contaminates agricultural crops like rice and groundwater.

97. (A) Ionization Interference (AAS) — Addressed by lowering the flame temperature to absolute zero
Lowering the flame temperature to absolute zero is physically impossible and would prevent sample atomization. Ionization interference in atomic absorption spectroscopy occurs when high temperatures convert ground-state atoms into ions. This is addressed by adding an ionization suppressor, such as cesium or potassium, which ionizes easily and floods the flame with electrons.

98. (C) Inductively Coupled Plasma Optical Emission Spectrometry.
Inductively coupled plasma optical emission spectrometry is the most appropriate instrument for analyzing macro-elements and ultra-trace elements simultaneously in agricultural samples. This technique provides an exceptionally wide linear dynamic range, allowing the high-temperature plasma to excite different elements and measure their emission lines across vastly different concentrations without multiple dilutions.

99. (C) Statement I is correct and Statement II is incorrect.
Developing an accurate near infrared calibration model requires correlating spectral scans of a large, diverse sample set with chemical values from primary reference methods. Because near infrared absorption is highly matrix-dependent, a calibration model developed for one specific food product, like wheat, cannot be applied to a different product like cheese.

100. (D) Near Infrared Reflectance (NIR) Spectroscopy
Near infrared reflectance spectroscopy is the most suitable technology for the rapid, non-destructive, and continuous inline monitoring of protein and fat in raw milk. This optical method requires no sample preparation, collecting real-time spectra as milk flows through process pipes and using multivariate calibration models to calculate fat and protein content.

101. (B) qNMR requires external calibration curves from identical reference standards.
Quantitative nuclear magnetic resonance spectroscopy is a primary ratio method that does not require calibration curves from identical chemical reference standards. Because the integrated peak area is directly proportional to the number of active nuclei, analysts can quantify any target analyte using a single, high-purity internal standard of a completely different chemical structure.

102. (C) It increases spin-state population differences, boosting sensitivity.
Increasing the external magnetic field strength in a nuclear magnetic resonance spectrometer enhances analytical sensitivity and chemical shift resolution. The stronger magnetic field increases the energy difference between nuclear spin states, leading to a larger population difference according to the Boltzmann distribution and yielding a stronger, more defined resonance signal.

103. (D) PLS — A regression method correlating spectral data to a target variable.
Partial least squares is a supervised multivariate regression method widely used to correlate complex spectral data, such as near infrared spectra, with specific target reference values. In contrast, principal component analysis is an unsupervised exploratory method for pattern recognition, while linear discriminant analysis is a supervised classification technique for separating groups.

104. (A) High-Resolution NMR Spectroscopy.
High-resolution nuclear magnetic resonance spectroscopy is the most definitive technique to verify the authenticity of Manuka honey and identify adulteration with high-fructose corn syrup. This powerful method profiles the specific isotopic distribution and complex structural arrangements of sugars and trace marker compounds, providing

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unique molecular fingerprints that reveal artificial syrup addition.

105. (B) Halogens and non-metals.
Halogens and non-metals are generally impossible to detect using standard flame atomic absorption spectroscopy. These elements possess extremely high excitation energies, requiring absorption lines in the far vacuum ultraviolet spectral region. Furthermore, standard air-acetylene or nitrous oxide-acetylene flames lack the thermal energy required to excite or atomize these non-metallic species.

106. (B) Diamond or Zinc Selenide crystal.
Diamond and zinc selenide are the standard high refractive index materials used to construct crystals for attenuated total reflectance accessories in Fourier transform infrared spectroscopy. These crystals must possess high optical throughput across the infrared spectral range and outstanding mechanical durability, allowing the infrared beam to undergo internal reflection at the interface.

107. (A) Both A and R are true and R is the correct explanation of A.
Fourier transform infrared spectroscopy with attenuated total reflectance is an official, rapid method for determining trans fatty acids in oils. The analysis relies on a highly characteristic, isolated absorption band around nine hundred and sixty-six wavenumbers, which corresponds to the carbon-hydrogen out-of-plane deformation unique to trans double bonds.

108. (C) A chromophore is the molecular part responsible for UV absorption, often containing conjugated double bonds.
A chromophore is the specific functional group within a molecule that is responsible for absorbing ultraviolet or visible light. These structures typically contain unsaturated bonds or conjugated double-bond systems, where valence electrons can easily transition between electronic energy levels, such as pi to pi-star transitions, upon absorbing characteristic wavelengths.

109. (B) I, II, and IV
A dual-beam ultraviolet-visible spectrophotometer contains a light source emitting both ultraviolet and visible wavelengths, alongside a beam splitter or chopper that alternates the light path. This setup directs the light simultaneously through the reference and sample cuvette compartments, continuously correcting for fluctuations in light intensity to ensure highly stable measurements.

110. (C) A shift of the absorption maximum to a longer wavelength (red shift).
A bathochromic shift is defined as the physical shifting of the maximum absorption wavelength of a chemical substance toward a longer wavelength, which is commonly referred to as a red shift. This spectral change is typically caused by changes in solvent polarity, temperature, or structural modifications such as increased molecular conjugation.

111. (A) P-III, Q-IV, R-I, S-II
Infrared spectral regions correlate with specific molecular vibrations. The high-frequency region from four thousand to twenty-five hundred wavenumbers represents single bond stretching of hydrogen. Triple bonds absorb from twenty-five hundred to two thousand, double bonds absorb from two thousand to fifteen hundred, and the fingerprint region contains complex bending vibrations.

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112. (D) Near Infrared region — 50 to 100 nm
The near infrared region is incorrectly defined as fifty to one hundred nanometers. The near infrared spectral range actually spans from seven hundred and eighty nanometers to twenty-five hundred nanometers. The far ultraviolet region covers ten to two hundred nanometers, near ultraviolet is two hundred to four hundred, and visible light is four hundred to seven hundred and fifty.

113. (A) FTIR Spectroscopy (often combined with milk analyzers)
Fourier transform infrared spectroscopy, integrated into automated milk analyzers, is the most practical technique for rapid, simultaneous detection of urea and maltodextrin at dairy reception docks. This vibrational spectroscopy method scans raw milk samples within seconds, identifying anomalous absorption bands associated with these common adulterants without requiring labor-intensive chemical reagents.

114. (A) Both Statement I and Statement II are correct.
Transmission electron microscopy forms highly detailed images based on electrons that pass through ultra-thin sections of a specimen. Conversely, scanning electron microscopy generates topographical images by capturing secondary

or backscattered electrons that are ejected from the specimen surface when bombarded by the scanning primary electron beam.

115. (A) Transmission Electron Microscopy (TEM)
Transmission electron microscopy is the most powerful technique to directly visualize the internal structure and measure the size of fifty-nanometer nano-emulsion vesicles. This method utilizes high-energy electrons with extremely short wavelengths, achieving sub-nanometer spatial resolution that far exceeds the physical diffraction limits of conventional light microscopes.

116. (D) Non-conductive samples must remain uncoated to prevent distortion of the image by metallic artifacts.
Non-conductive food samples must be coated with a thin layer of conductive material, such as gold or carbon, prior to scanning electron microscopy imaging. Leaving these samples uncoated causes them to accumulate electrostatic charge from the electron beam, leading to severe thermal damage and image distortion, which prevents high-resolution analysis.

117. (B) Cause: Non-conductive samples accumulate static charge. Effect: Coating provides a ground path, preventing charging.
Non-conductive food specimens accumulate static charges when bombarded by the intense electron beam in a scanning electron microscope. Sputter coating these specimens with a thin, uniform layer of gold creates a highly conductive surface, providing a electrical ground path that successfully prevents charging artifacts and yields sharp, stable images.

118. (C) Charging artifact (SEM) — Appears as bright, distorted areas from electron buildup.
Charging is a common artifact in scanning electron microscopy that appears as extremely bright, distorted areas on the image. This phenomenon occurs when non-conductive specimens fail to dissipate incoming electrons, causing a local accumulation of static electrical charge that repels and deforms the primary electron beam during scanning.

119. (D) Confocal Laser Scanning Microscopy (CLSM)
Confocal laser scanning microscopy is the most appropriate imaging technique to study droplet size distribution and flocculation in mayonnaise in its natural, hydrated state. This method allows for the direct, non-destructive optical sectioning of fluorescently labeled emulsions, avoiding the drying or high-vacuum preparation steps that disrupt delicate structures.

120. (A) A 2-millimeter thick slice of whole raw beef
A two-millimeter thick slice of raw beef is completely unsuitable for direct transmission electron microscopy. Because the electron beam has extremely low penetrating power, the specimen must be under one hundred nanometers in thickness. Thick biological tissues block the electrons entirely, necessitating chemical fixation, embedding, and ultra-thin sectioning beforehand.

121. (B) SYTO 9 and Propidium Iodide (PI)
The LIVE/DEAD BacLight viability kit consists of two distinct fluorescent nucleic acid stains: SYTO nine and propidium iodide. SYTO nine penetrates all bacterial membranes to stain green, while propidium iodide enters only cells with damaged membranes, displacing SYTO nine to stain dead cells red, enabling rapid fluorescence differentiation.

122. (A) Both A and R are true and R is the correct explanation of A.
Confocal laser scanning microscopy generates sharp images of thick, intact food specimens by utilizing a physical pinhole aperture. Positioned in the conjugate focal plane in front of the detector, this pinhole mechanically blocks out-of-focus light from reaching the detector, ensuring that only light from the selected focal plane is recorded.

123. (A) It blocks out-of-focus emission light from reaching the detector.
The primary function of the pinhole in confocal laser scanning microscopy is to block out-of-focus emission light from reaching the detector. By strictly filtering out light originating from above and below the focal plane of the specimen, the pinhole ensures that only in-focus photons are collected, maximizing vertical resolution.

124. (A) I, II, and III
Fluorescence resonance energy transfer is a highly distance-dependent physical process where energy is transferred non-radiatively from an excited donor fluorophore to an acceptor. This phenomenon operates on the nanometer scale and occurs only when the emission spectrum of the donor overlaps significantly with the excitation spectrum of the acceptor.

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125. (D) The wavelength difference between absorption and emission maxima of a fluorophore.
Stokes shift is defined as the physical wavelength difference between the absorption maximum and the emission maximum of a fluorescent chemical species. This shift occurs because some energy is lost through rapid vibrational relaxation before the excited electron returns to its ground state, causing the emitted light to have longer wavelengths.

126. (A) P-II, Q-IV, R-III, S-I
Fluorescent stains target specific food components. Nile Red binds specifically to neutral lipids, while Calcofluor White labels cellulose and chitin in plant walls and fungi. Fluorescein isothiocyanate covalently labels amino groups on proteins, and Fast Green FCF functions as a valuable, non-covalent counterstain for visualizing the overall protein network.

127. (B) Hollow Cathode Lamp — Transmission Electron Microscopy (TEM)
A hollow cathode lamp is not used in transmission electron microscopy, as these lamps emit sharp elemental atomic emission lines designed specifically for atomic absorption spectroscopy. Transmission electron microscopes utilize high-energy electron sources, such as heated tungsten filaments, lanthanum hexaboride cathodes, or field emission guns, to generate the illumination beam.

128. (D) CLSM using multiple specific fluorescent probes.
Confocal laser scanning microscopy combined with multiple specific fluorescent stains is the most appropriate approach to study living biofilms. This method non-destructively images the three-dimensional architecture of the biofilm, allowing researchers to simultaneously map the extracellular polymer matrix and visualize active bacterial cells without disrupting the delicate hydrated structure.

129. (A) Both Statement I and Statement II are correct.
Direct ELISA protocols are faster because they require only a single, enzyme-conjugated primary antibody to bind the antigen. However, indirect assays offer significantly higher sensitivity. Because multiple enzyme-labeled secondary antibodies can bind to different epitopes on a single primary antibody, this configuration amplifies the final colorimetric or fluorescent signal.

130. (C) Competitive ELISA
Competitive ELISA is the standard screening format for quantifying small molecules like Aflatoxin M1 in raw milk. Because small haptens lack multiple binding sites, they cannot bind two antibodies simultaneously in a sandwich assay. The competitive format resolves this, providing highly sensitive, cost-effective, and high-throughput quantitation of trace toxins.

131. (A) High cross-reactivity is desirable for designing highly specific allergen tests.
High cross-reactivity is undesirable when designing allergen tests, as it causes antibodies to bind non-specifically to unrelated proteins, leading to false-positive results. Allergen assays require highly specific antibodies, such as monoclonal varieties, to ensure the test reacts uniquely with the target allergen and avoids cross-reacting with other matrix proteins.

132. (D) Cause: Detection enzyme oxidizes substrate. Effect: A colored product forms.
Adding a chromogenic substrate represents the final detection step in an enzyme-linked immunosorbent assay. The conjugated enzyme, such as horseradish peroxidase, chemically oxidizes the substrate, converting it into a stable, colored product. The intensity of this color change is measured spectrophotometrically to calculate the concentration of target analytes.

133. (B) Conjugate Pad — Holds dried, labeled antibodies that bind the target analyte.
The conjugate pad is a key component in a lateral flow immunoassay, as it holds dried, labeled antibodies that specifically bind the target analyte. When the liquid sample flows through the pad, these antibodies dissolve and bind the target, forming mobile complexes that migrate toward the active capture lines.

134. (C) Lateral Flow Immunoassay.
Lateral flow immunoassays are the most appropriate technology to deliver rapid, visual results for Salmonella detection on-site within fifteen minutes. These self-contained test strips rely purely on capillary flow and immune recognition, requiring no electricity, specialized laboratory instruments, or technical expertise, making them ideal for field food safety inspectors.

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135. (D) Using highly purified, nuclease-free water to prepare the master mix
Preparing the reaction mix with highly purified, nuclease-free water does not decrease PCR amplification efficiency. Instead, it is a critical step that prevents the degradation of primers and template DNA. In contrast, PCR efficiency is reduced by inhibitors like humic acids, high salt concentrations, or degraded templates from thermal food processing.

136. (A) The cycle number where fluorescence signal crosses background threshold.
The threshold cycle is defined as the specific amplification cycle number at which the accumulation of fluorescent signal rises above the background noise. This value is inversely proportional to the logarithm of the starting target DNA concentration, serving as the primary quantitative metric in real-time PCR assays.

137. (A) Both A and R are true and R is the correct explanation of A.
TaqMan chemistry delivers higher specificity than SYBR Green dye in real-time PCR assays. SYBR Green binds non-specifically to any double-stranded DNA molecule, including primer-dimers, which can distort results. Conversely, TaqMan probes utilize sequence-specific hybridization between primers, ensuring that fluorescent signals are generated only when the target gene is amplified.

138. (B) Thermal processing degrades DNA, blocking barcode amplification.
A major limitation of DNA barcoding in food testing is that intensive thermal processing, such as canning or refining, degrades genomic DNA into tiny fragments. This fragmentation prevents the successful PCR amplification of the target barcode sequence, making species identification highly challenging or impossible in heavily processed foods.

139. (B) I, II, and IV
Next-generation sequencing and metagenomics enable high-throughput analysis of food samples, sequencing millions of DNA fragments simultaneously. Amplicon sequencing of the sixteen-S ribosomal RNA gene profiles the entire bacterial community in fermented products. This culture-independent approach is highly valuable for identifying uncultivable food spoilage bacteria directly from the raw matrix.

140. (C) A 3D dataset containing two spatial dimensions and one spectral dimension.
A hypercube is a three-dimensional dataset generated during hyperspectral imaging. It contains two spatial dimensions, representing the physical coordinates of the sample surface, and one spectral dimension, which records a complete contiguous light wavelength spectrum for every pixel, allowing for the precise chemical mapping of food surfaces.

141. (A) P-II, Q-I, R-IV, S-III
Electronic tongues utilize distinct electrochemical principles. Potentiometry measures the potential difference between electrodes at zero current. Voltammetry monitors the current produced by redox reactions at varying potentials. Impedance spectroscopy records resistance to alternating current across frequencies, while optical sensing registers colorimetric changes in reactive sensor array spots.

142. (C) Horse meat in beef patties — Detected definitively via UV-Visible Spectrophotometry
UV-visible spectrophotometry cannot determine meat species substitution, such as horse meat in beef patties, due to similar optical profiles. Species authentication requires molecular techniques like DNA barcoding, real-time PCR, or enzyme-linked immunosorbent assays that target species-specific genetic markers or proteins, rather than bulk light absorbance.

143. (B) DNA Barcoding (sequencing the COI gene)
DNA barcoding, specifically sequencing the mitochondrial cytochrome c oxidase subunit I gene, is the most definitive technique to prove fish species substitution. This method amplifies a highly conserved gene region and compares its sequence against global databases, providing legally unassailable species-level identification of raw or minimally processed fillets.

144. (C) Statement I is correct and Statement II is incorrect.
In a time-of-flight mass analyzer, all ions are accelerated using the same electrical field, giving them equal kinetic energy. Because kinetic energy is proportional to mass and velocity squared, lighter ions travel faster through the flight tube and reach the detector first, while heavier ions travel more slowly.

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145. (A) Electronic Nose
An electronic nose is the most appropriate sensor technology to monitor oxidative lipid rancidity in potato chips. This system uses an array of non-specific chemical sensors that detect volatile oxidation products, such as hexanal and other aldehydes, generating a unique headspace fingerprint that correlates with sensory panels.

146. (C) HSI outputs single numerical values, requiring no image analysis.
Hyperspectral imaging does not output single numerical values. Instead, it produces a massive three-dimensional data cube containing millions of data points representing both spatial pixels and contiguous spectral bands. Analyzing these datasets requires advanced chemometric techniques, such as principal component analysis, to extract meaningful chemical distribution maps.

147. (A) Cause: Matrix absorbs laser pulses. Effect: Matrix vaporizes, ionizing intact analytes.
In matrix-assisted laser desorption/ionization, a chemical matrix co-crystallizes with the analyte. The matrix absorbs ultraviolet laser energy, leading to rapid heating and vaporization. This process desorbs and ionizes intact, large biomolecules, such as proteins, without causing fragmentation, facilitating subsequent time-of-flight mass analysis.

148. (D) Chiral GC — Measures enantiomeric ratio of aroma compounds.
Chiral gas chromatography is a powerful technique for determining the enantiomeric ratios of aroma compounds in foods. Natural food flavors typically possess specific, biologically controlled ratios of enantiomers. Measuring these chiral distributions allows laboratories to differentiate between premium natural ingredients and cheap, synthetically produced flavor additives.

149. (B) Data fusion using multivariate chemometrics.
Combining data from both an electronic nose and an electronic tongue to evaluate sensory profiles represents a multi-sensor data fusion approach. This method integrates volatile aroma and dissolved taste datasets, applying advanced multivariate chemometric algorithms to perform comprehensive classifications and construct highly accurate sensory models.

150. (C) DNA is highly stable and easily survives distillation and calcination temperatures exceeding 300°C.
DNA molecules are not highly stable and cannot survive extreme processing temperatures exceeding three hundred degrees Celsius. High temperatures and distillation processes degrade and physically destroy the phosphodiester backbone, making it a major limitation. Refinement, filtration, and acid hydrolysis remove or destroy template DNA, making amplification extremely difficult.

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CHAPTER 23

Food Quality, Sensory Evaluation, Quality Assurance and Quality Control

1. Which of the following best defines "food quality" in the context of food manufacturing and consumer acceptance?
(A) The sum of properties and characteristics that influence consumer acceptability
(B) The absolute freedom of a food product from any pathogenic microorganisms
(C) The nutritional adequacy of a food product to satisfy daily dietary demands
(D) The physical appearance and long-term storage stability of packaged foods

2. The following question consists of two statements, one labeled as Assertion (A) and the other as Reason (R). Choose the correct option:
Assertion (A): Convenience foods often undergo more severe processing, which can sometimes compromise their nutritional quality.
Reason (R): Severe thermal processing used to extend shelf-life and enhance convenience can degrade heat-sensitive vitamins.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

3. Which of the following is NOT considered a "hidden" quality attribute of food?
(A) Surface colour
(B) Nutritional value
(C) Microbiological safety
(D) Toxicological safety

4. Match List I with List II and select the correct option:
List I: (Quality Attribute)
P. Sensory attribute
Q. Safety attribute
R. Nutritional attribute
S. Convenience attribute
List II: (Example)
I. Absence of heavy metals
II. Microwaveable packaging
III. Crispiness of potato chips
IV. Ascorbic acid content
(A) P-I, Q-III, R-II, S-IV
(B) P-III, Q-II, R-I, S-IV
(C) P-IV, Q-I, R-III, S-II
(D) P-III, Q-I, R-IV, S-II

5. Which of the following statements correctly describes a "safety attribute" of food quality?
(A) The ease of evaluation by the consumer at the point of purchase using human senses.
(B) The absence of pathogenic bacteria, natural toxins, and harmful chemical residues.
(C) The chemical analysis of caloric density and the macronutrient profile of the food.
(D) The physical ease with which a consumer can prepare and consume the food product.

6. Given below are some statements regarding the dimensions of food quality:
1. Intrinsic quality cues are physical characteristics of the product itself, such as colour and texture.
2. Extrinsic quality cues include price, brand name, and packaging design.
3. Credence attributes can be easily verified by the consumer immediately after consumption.
4. Experience attributes are evaluated only during or after the consumption of the food.
Which of the above statements is/are correct?
(A) 1, 2, and 3
(B) 2, 3, and 4
(C) 1, 2, and 4
(D) 1, 3, and 4

7. Which of the following statements regarding the nutritional quality of food is incorrect?
(A) Nutritional quality is generally imperceptible to human senses during consumption.
(B) Fortification is a method used to enhance

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the nutritional quality of staple foods.
(C) Nutritional labelling provides extrinsic cues regarding the nutritional quality.
(D) Food processing always negatively impacts the nutritional quality of a food product.

8. Given below are sensory attributes perceived when evaluating a food product:
1. Taste
2. Appearance
3. Texture (Mastication)
4. Odour/Aroma

Arrange these in the correct chronological sequence in which a consumer typically perceives them.
(A) 2, 4, 1, 3
(B) 2, 4, 3, 1
(C) 4, 2, 3, 1
(D) 2, 1, 4, 3

9. A Food Safety Officer inspects a batch of bottled apple juice. The juice shows slight enzymatic browning but laboratory tests confirm the complete absence of pathogens, chemical hazards, and physical contaminants. Based on quality dimensions, what is the primary issue with this batch?
(A) It fails safety quality standards but meets sensory quality standards.
(B) It fails sensory quality standards but meets safety quality standards.
(C) It fails nutritional quality standards but meets convenience quality standards.
(D) It fails both safety and sensory quality standards simultaneously.

10. Given below are two statements:
Statement I: Shelf-life is an integral part of food quality that dictates how long a product retains its desired sensory, nutritional, and safety characteristics under specified storage conditions.
Statement II: The expiration date strictly guarantees that the food will completely lack pathogenic microorganisms regardless of storage conditions.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

11. A food manufacturer decides to replace a traditional glass bottle with a lightweight, easy-squeeze plastic pouch for tomato ketchup. Which specific quality dimension is the manufacturer primarily aiming to improve?
(A) Convenience quality
(B) Nutritional quality
(C) Sensory quality
(D) Safety quality

12. Identify the incorrect pair of a factor affecting food quality and its typical consequence.
(A) Prolonged high-temperature storage — Acceleration of lipid oxidation
(B) Improper harvesting techniques — Mechanical damage leading to microbial spoilage
(C) Maillard reaction during baking — Complete loss of structural dietary fiber
(D) High humidity during storage — Caking of hygroscopic food powders

13. Which of the following options represents the most appropriate definition of "experience attributes" in food quality?
(A) Attributes that a consumer can determine merely by looking at the food package on a shelf.
(B) Attributes that cannot be verified even after the food is consumed, requiring laboratory testing.
(C) Attributes that are influenced solely by the marketing campaigns and brand reputation of the manufacturer.
(D) Attributes that can only be ascertained by the consumer during or immediately after eating the food.

14. Identify the correct pair of a quality concept and its relevant example.
(A) Extrinsic cue — The measured dynamic viscosity of a salad dressing
(B) Intrinsic cue — The retail price tag on a premium chocolate box
(C) Credence attribute — The organic certification of farm produce
(D) Convenience attribute — The calculated calorie count per serving

15. Who defined quality in the context of food as "the composite of those characteristics that differentiate individual units of a product and

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have significance in determining the degree of acceptability of that unit by the buyer"?
(A) Deming
(B) Kramer and Twigg
(C) Juran
(D) Ishikawa

16. Which of the following definitions best describes "Sensory Evaluation" as endorsed by the Institute of Food Technologists (IFT)?
(A) A strategic marketing methodology employed to determine the maximum financial value and retail price a consumer is willing to pay for foods.
(B) A basic, non-instrumental, and purely subjective inspection method utilized for assessing food safety risks based primarily on visual appearance.
(C) An advanced analytical laboratory technique utilizing specialized electronic sensors and software designed to mimic human gustatory responses.
(D) A scientific discipline used to evoke, measure, analyze, and interpret consumer reactions to characteristics of foods perceived by the senses.

17. The following question consists of two statements, one labeled as Assertion (A) and the other as Reason (R). Choose the correct option:
Assertion (A): The quality of raw materials strictly determines the maximum potential quality of the final processed food product.
Reason (R): Processing techniques can often reverse the spoilage and fully restore the original quality of degraded raw materials.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

18. Which of the following is NOT a pre-harvest factor affecting the quality of agricultural raw materials?
(A) Soil fertility and fertilization
(B) Climatic conditions during growth
(C) Method of blanching applied
(D) Genetic makeup of the crop cultivar

19. Match List I with List II and select the correct option:
List I: (Processing/Storage Factor)
P. Chilling injury
Q. Severe thermal processing
R. Exposure to light
S. High shear mixing
List II: (Effect on Food Quality)
I. Emulsion destabilization or phase separation
II. Destruction of heat-labile vitamins
III. Surface pitting and internal discoloration in tropical fruits
IV. Photo-oxidation of fats and pigments
(A) P-III, Q-II, R-IV, S-I
(B) P-II, Q-III, R-I, S-IV
(C) P-IV, Q-I, R-II, S-III
(D) P-III, Q-IV, R-I, S-II

20. Which of the following statements correctly identifies the impact of storage conditions on food quality?
(A) Fluctuating storage temperatures maintain the sensory quality of frozen foods better than constant low temperatures.
(B) Increased water activity during commercial storage typically retards the growth of common food spoilage organisms.
(C) Oxygen presence in modified atmosphere packaging solely affects bacterial growth and has no impact on food oxidation.
(D) Controlling relative humidity is crucial to prevent moisture loss in fresh produce and moisture gain in dry foods.

21. Given below are some statements regarding the importance of sensory evaluation in the food industry:
1. It is essential for new product development and formula optimization.
2. It can be entirely replaced by advanced instrumental techniques like GC-MS and texture analyzers.
3. It helps in establishing shelf-life by tracking sensory degradation over time.
4. It is utilized in quality control to ensure batch-to-batch consistency.
Which of the above statements is/are correct?
(A) 1, 2, and 3
(B) 1, 3, and 4
(C) 2, 3, and 4
(D) 1, 2, and 4

22. Which of the following statements regarding the sensory evaluation environment is incorrect?
(A) Sensory testing rooms should have a positive

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air pressure to prevent external odors from entering.
(B) Lighting in sensory booths can be masked using colored lights to prevent visual bias.
(C) Evaluators are encouraged to use strong perfumes to mask any ambient laboratory odors.
(D) Ambient temperature and humidity must be controlled to ensure panelist comfort and consistent product perception.

23. A food manufacturer observes a gradual loss of distinct strawberry flavor and the development of a generic "cooked" note in a jam during thermal processing. Which cause-and-effect relationship best explains this sensory change?
(A) Cause: Activation of polyphenol occupational oxidase enzymes; Effect: Generation of synthetic flavor compounds and artificial pigments.
(B) Cause: Rapid coagulation of structural pectin networks; Effect: Significant enhancement of the natural fresh fruit aroma.
(C) Cause: Progressive freezing out of pure water molecules; Effect: Excessive concentration of highly reactive flavor precursors.
(D) Cause: Evaporation and degradation of volatile esters; Effect: Loss of natural fruit aroma and overall flavor alteration.

24. A quality control manager notices that a recent batch of potato chips is excessively dark brown and has a slightly bitter taste. The raw material supplier recently switched potato varieties. What is the most likely cause of this quality defect during frying?
(A) High levels of reducing sugars in the new variety causing excessive Maillard browning.
(B) Elevated levels of starch in the new potato variety causing rapid starch gelatinization.
(C) Excessive moisture content in the tissue causing rapid thermal oxidation of frying oil.
(D) High gluten-forming protein content leading to the development of tough cellular networks.

25. Given below are two statements:
Statement I: Sensory evaluation provides integrated data on how multiple attributes of a food are perceived simultaneously by human subjects.
Statement II: Instrumental measurements typically isolate and measure specific physical or chemical parameters without accounting for human perceptual interactions.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

26. A juice processor wants to extend the shelf-life of a product while preserving its delicate flavor profile and heat-sensitive vitamins, which are typically destroyed by standard pasteurization. Which processing application is most appropriate?
(A) Ultra-High Temperature (UHT) processing
(B) High Pressure Processing (HPP)
(C) Canning and retorting
(D) Hot air dehydration

27. Identify the incorrect pair of a raw material factor and its sensory consequence.
(A) Over-ripening of fruits — Increased firmness and tartness
(B) Animal stress before slaughter — Dark, Firm, and Dry (DFD) or Pale, Soft, Exudative (PSE) meat
(C) High somatic cell count in milk — Off-flavors and reduced cheese yield
(D) Sprouting in grains — Increased alpha-amylase activity and altered dough texture

28. Which of the following represents the most appropriate justification for conducting human sensory evaluation alongside instrumental analysis in quality control?
(A) Human sensory panels produce highly reproducible, standardized data that is completely immune to fatigue compared to automated instruments.
(B) Sensory evaluation requires significantly less overall time and capital financial investment than operating routine quality control instruments.
(C) Instruments cannot replicate the complex psychological and physiological integration of perception experienced by human consumers.
(D) Sensory evaluation methodologies provide exact, direct quantitative measurements of specific target chemical concentrations in

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the food.

29. Identify the correct pair of a sensory attribute and its corresponding physical/chemical stimulus.
(A) Astringency — Volatile short-chain fatty acids
(B) Odour — High molecular weight non-volatile proteins
(C) Crispness — Hydrogen ion concentration
(D) Umami — Glutamate and specific ribonucleotides

30. What is the psychological error in sensory evaluation where a panelist's rating of one attribute influences their rating of other unrelated attributes in the same sample?
(A) Expectation error
(B) Stimulus error
(C) Halo effect
(D) Habituation

31. Which of the following defines "texture" in the context of food sensory attributes?
(A) The multi-dimensional visual perception of ambient light reflected directly from the external surface of a finished food product.
(B) The structural, mechanical, and surface properties of foods detected through the senses of vision, hearing, touch, and kinesthetics.
(C) The complex chemical perception of volatile organic compounds by olfactory receptors located inside the human nasal cavity.
(D) The basic physiological gustatory response detected solely by specialized taste receptor cells situated on the tongue and palate.

32. The following question consists of two statements, one labeled as Assertion (A) and the other as Reason (R). Choose the correct option:
Assertion (A): The perception of pungency from chili peppers is not classified as a basic taste or an aroma.
Reason (R): Pungency is a chemesthetic sensation mediated by the trigeminal nerve endings in the oral and nasal cavities.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

33. Which of the following is NOT recognized as one of the fundamental basic tastes perceived by the human gustatory system?
(A) Astringent
(B) Sweet
(C) Sour
(D) Bitter

34. Match List I with List II and select the correct option:
List I: (Sensory Attribute)
P. Taste
Q. Aroma
R. Pungency
S. Colour
List II: (Primary Physiological Receptor)
I. Trigeminal nerve endings
II. Photoreceptors (Rods and Cones)
III. Olfactory epithelium
IV. Gustatory papillae
(A) P-III, Q-IV, R-II, S-I
(B) P-IV, Q-I, R-III, S-II
(C) P-IV, Q-III, R-I, S-II
(D) P-II, Q-III, R-I, S-IV

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35. Which statement correctly differentiates between orthonasal and retronasal olfaction?
(A) Orthonasal occurs via the external nares, while retronasal occurs when volatiles reach the olfactory epithelium from the oral cavity.
(B) Orthonasal olfaction occurs primarily during the swallowing of food, while retronasal olfaction occurs during active sniffing.
(C) Orthonasal olfaction detects basic tastes on the tongue, whereas retronasal olfaction detects complex food aromas in the mouth.
(D) Orthonasal olfaction is mediated by the trigeminal nerve, whereas retronasal olfaction is mediated directly by the optic nerve.

36. Given below are some statements regarding the visual appearance of food:
1. Appearance is often the initial attribute evaluated by consumers and heavily influences subsequent expectations.
2. Colour perception can significantly alter a consumer's perception of flavor intensity.
3. Gloss or shine is considered a texture attribute rather than a visual appearance attribute.
4. Product size and shape are integral components of visual appearance.

Which of the above statements is/are correct?
(A) 1, 2, and 3
(B) 2, 3, and 4
(C) 1, 3, and 4
(D) 1, 2, and 4

37. Which of the following statements about 'specific anosmia' is incorrect?
(A) It is the inability to perceive a specific odorant despite having otherwise normal olfactory function.
(B) It is typically caused by a viral infection damaging the entire olfactory bulb.
(C) It is often a genetically determined condition.
(D) A common example is the inability of some individuals to smell androstenone.

38. Given below are physiological events for retronasal aroma perception during eating:
1. Volatile compounds are released from the food matrix during mastication.
2. Volatiles bind to olfactory receptors generating neural signals.
3. Volatiles travel up through the nasopharynx to the nasal cavity.
4. The brain integrates the signals to perceive flavor.

Arrange the events in the correct sequence.
(A) 3, 1, 2, 4
(B) 1, 2, 3, 4
(C) 1, 3, 2, 4
(D) 2, 1, 3, 4

39. A panelist is given a clear, uncolored beverage that is heavily flavored with cherry extract, and simultaneously given a red-colored beverage flavored entirely with lemon extract. The panelist reports the red beverage tastes like cherry. What sensory interaction does this case illustrate?
(A) Physiological texture-flavor masking interaction
(B) Specific genetic anosmia to volatile compounds
(C) Chemical-induced trigeminal desensitization
(D) Visual-flavor interaction (expectation error)

40. Given below are two statements:
Statement I: Flavor is a multidimensional sensory experience that integrates input from taste buds, olfactory receptors, and trigeminal nerve endings.
Statement II: Taste refers strictly to the sensations perceived by the taste receptors located on the tongue and palate.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

41. A food technologist is developing a functional beverage containing bitter-tasting botanical extracts. Which of the following applications is most commonly used to mask bitterness in such food formulations?
(A) Significantly decreasing the dynamic viscosity of the beverage
(B) Adding a sweetening agent like sucrose or high-intensity sweeteners
(C) Substantially increasing the serving temperature of the beverage
(D) Incorporating an intense red colorant to visually alter the beverage

42. Identify the incorrect pair of a basic taste and its standard reference chemical used for panel training.
(A) Sweet — Sucrose
(B) Sour — Quinine sulfate
(C) Salty — Sodium chloride
(D) Umami — Monosodium glutamate

43. Which of the following is the most appropriate definition of kinesthetic texture attributes?
(A) Deep pressure and jaw muscle movement sensations during mastication.
(B) Temperature sensations perceived by thermal receptors situated in the skin.
(C) Auditory crunching sounds produced by teeth during the initial bite of food.
(D) Chemical irritation and burn caused by active spices in the oral cavity.

44. Identify the correct pair of a trigeminal active compound and its characteristic sensory effect.
(A) Capsaicin — Astringency
(B) Tannins — Burning sensation
(C) Menthol — Cooling sensation
(D) Piperine — Cooling sensation

45. The study of the deformation and flow of matter, which is fundamentally related to the objective measurement of food texture, is known as:

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(A) Psychophysics
(B) Tribology
(C) Spectroscopy
(D) Rheology

46. In the context of sensory evaluation, which of the following defines an "expert sensory panelist"?
(A) An untrained consumer selected from the target market who regularly purchases and consumes the specific food product being tested.
(B) A professional laboratory technician who routinely operates advanced instrumental texture analyzers and computerized colorimeters.
(C) An individual with high sensory acuity, extensive formal training, and prolonged experience evaluating a specific product category.
(D) Any person selected completely at random from the general public to express their personal hedonic preference for a food item.

47. The following question consists of two statements, one labeled as Assertion (A) and the other as Reason (R). Choose the correct option:
Assertion (A): Sensory evaluation booths should be equipped with positive air pressure systems and activated carbon filters.
Reason (R): This setup completely eliminates the psychological biases of panelists such as the halo effect and expectation error.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

48. Which of the following is NOT a standard screening test used during the selection of panelists for a trained sensory panel?
(A) Basic taste identification and threshold verification test
(B) Odour recognition and descriptive vocabulary evaluation test
(C) Ishihara standard diagnostic test for red-green colour blindness
(D) Hedonic preference assessment test for popular commercial brands

49. Match List I with List II and select the correct option:

List I: (Sensory Panel Type)
P. Trained Descriptive Panel
Q. Consumer Panel
R. Expert Panel
S. Internal QC Panel
List II: (Primary Characteristic/Use)
I. Large group (N>100) assessing product acceptance and preference
II. Highly specialized individuals (1-3) assessing specific commodities like wine or tea
III. Small group (8-12) heavily calibrated to profile specific attribute intensities
IV. Semi-trained employees checking daily production against a reference standard
(A) P-III, Q-I, R-II, S-IV
(B) P-I, Q-III, R-IV, S-II
(C) P-III, Q-II, R-I, S-IV
(D) P-II, Q-I, R-III, S-IV

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50. Which of the following statements regarding the management of sensory evaluation samples is correct?
(A) Samples should be labeled with commercial brand names to provide realistic context to panelists.
(B) Panelists must receive samples in the exact same order to simplify computerized statistical entry.
(C) All samples in a session must be identical in size, volume, and temperature to prevent bias.
(D) Sample preparation should occur in the main testing room where panelists evaluate the food products.

51. Given below are some statements regarding sensory testing protocol:
1. Three-digit random codes are used to label samples to avoid introducing psychological bias.
2. Palate cleansers like plain water or unsalted crackers are used between samples to prevent flavor carryover.
3. Sensory testing is best conducted immediately after panelists have consumed a large, heavy meal.
4. Randomization of presentation order helps neutralize positional bias.

Which of the above statements is/are correct?
(A) 1, 2, and 4
(B) 2, 3, and 4
(C) 1, 3, and 4
(D) 1, 2, and 3

52. Which of the following statements about sensory panel training and management is incorrect?
(A) Panelists should be strictly discouraged from smoking or drinking strong coffee directly prior to any analytical sensory session.
(B) Continuous monitoring and statistical validation of trained panelist performance is necessary to ensure long-term data reliability.
(C) Financial or non-financial motivation incentives are routinely required to maintain panelist focus over multiple testing sessions.
(D) Panelists who demonstrate poor performance during initial screening should be forced to undergo training until they become experts.

53. A sensory panel consistently rates the second sample in a series as having a less intense flavor than the first sample, regardless of which physical sample is presented second. Which cause-and-effect relationship explains this phenomenon?
(A) Cause: Stimulus error; Effect: Evaluation bias based on external packaging cues and brand expectations.
(B) Cause: Sensory adaptation and fatigue; Effect: Time-order error and reduced sensitivity to subsequent samples.
(C) Cause: Central tendency error; Effect: Hesitation of panelists to use extreme ends of the descriptive rating scale.
(D) Cause: Contrast effect; Effect: Exaggeration of differences between a high-intensity and a low-intensity sample.

54. A company is setting up a trained descriptive panel to evaluate the complex flavor profile of aged cheddar cheese. During the initial orientation, panelists struggle to agree on the definition of "nutty." What is the most effective management action?
(A) Dismiss the sensory panelists who cannot identify the nutty attribute immediately from the active testing pool.
(B) Skip the nutty attribute entirely and focus the panel on basic taste attributes like saltiness and sourness.
(C) Provide physical reference standards (e.g., roasted nuts) and allow the panel to align on the terminology.
(D) Allow each panelist to use their own personal definition of nutty during final testing to capture diversity.

55. Given below are two statements:
Statement I: The primary purpose of providing palate cleansers in sensory evaluation is to remove residual food materials and reset the oral environment to a baseline state.
Statement II: Highly acidic or strongly flavored palate cleansers are preferred because they forcefully wash away lingering fats from the oral cavity.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

56. When designing a sensory experiment to compare three different formulations of a beverage (A, B, and C), how should the sample presentation order be designed to minimize bias?
(A) Use a balanced block design so each sample appears in every position an equal number of times across the panel.
(B) Present the samples in strict alphabetical order (A, then B, then C) to all panelists during the evaluation.
(C) Present the designated control sample first to everyone, followed by samples B and C in a completely random order.
(D) Present all three formulations simultaneously after mixing them thoroughly in a single sensory serving container.

57. Identify the incorrect pair of a psychological error in sensory testing and its description.
(A) Expectation error — Panelist finds what they expect to find based on prior knowledge of the sample.
(B) Logical error — Panelist exhibits a reluctance to use the extreme ends of a rating scale, clustering responses near the middle.
(C) Mutual suggestion — A panelist's response is influenced by the vocalized reaction or facial expression of another panelist.
(D) Pattern effect — Panelist subconsciously identifies a pattern in the presentation order and responds based on the pattern rather than the sensory stimuli.

58. Which of the following represents the most appropriate timing to schedule routine analytical

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sensory testing sessions to maximize panelist acuity?
(A) Directly after a heavy lunch, around 2:00 PM, when panelists are fully relaxed and satisfied.
(B) Mid-morning or mid-afternoon when panelists are neither overly full nor extremely hungry.
(C) First thing in the morning before breakfast, when panelists have acute hunger and sensitivity.
(D) Late evening, right before sleep, when panelists have minimal daily stress and distraction.

59. Identify the correct pair of a potential sensory testing error and its standard mitigation strategy.
(A) Colour masking — Using red lighting in booths to obscure sample color differences
(B) Positional bias — Serving all sample types simultaneously in identical containers
(C) Carry-over effect — Increasing the stimulus concentration in subsequent samples
(D) Halo effect — Providing detailed commercial brand information prior to testing

60. According to general ISO guidelines for sensory laboratory design, what is the recommended neutral wall color for sensory booths to prevent visual distraction and color distortion?
(A) Bright primary colors
(B) Pure black
(C) Off-white or light neutral grey
(D) Dark green

61. Which of the following defines "discrimination testing" in sensory evaluation?
(A) Affective consumer testing methods used to measure brand preference and market acceptance across demographics.
(B) Descriptive profiling methods used to identify and quantify the exact intensity of specific flavor notes.
(C) Instrumental chromatography methods used to isolate and identify the chemical composition of food aromas.
(D) Analytical methods used to determine whether a perceptible sensory difference exists between two products.

62. The following question consists of two statements, one labeled as Assertion (A) and the other as Reason (R). Choose the correct option:

Assertion (A): In a standard triangle test, the probability of a panelist guessing the correct answer by chance alone is 33.3%.
Reason (R): The panelist is presented with three coded samples, two of which are identical and one is different, and is asked to identify the odd sample.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

63. Which of the following is NOT classified as a sensory discrimination test?
(A) Triangle test
(B) Preference ranking test
(C) Duo-trio test
(D) Paired comparison test

64. Match List I with List II and select the correct option:
List I: (Discrimination Test)
P. Triangle test
Q. Duo-trio test
R. 2-Alternative Forced Choice (2-AFC) paired comparison
S. 3-Alternative Forced Choice (3-AFC)
List II: (Statistical Guessing Probability)
I. 50% (1/2)
II. 33.3% (1/3)
III. 25% (1/4)
IV. 10% (1/10)
(A) P-I, Q-II, R-II, S-I
(B) P-II, Q-I, R-III, S-II
(C) P-III, Q-I, R-I, S-II
(D) P-II, Q-I, R-I, S-II

65. Which of the following statements correctly describes the methodology of a Duo-trio test?
(A) Panelists receive a reference, then two coded samples, and must identify which matches the reference.
(B) Panelists receive three coded samples simultaneously and must identify the single odd sample out.
(C) Panelists receive two coded samples and must state which sample is more intense in a specific attribute.
(D) Panelists receive a single sample and must classify it as acceptable or unacceptable after evaluation.

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66. Given below are some statements regarding a directional paired comparison test (2-AFC):
1. It is used when the sensory scientist knows the specific attribute that is likely to differ between the two samples.
2. The panelist is asked a directed question, such as "Which sample is sweeter?".
3. It has less statistical power than a simple difference test because the guessing probability is higher.
4. It requires panelists to be highly trained descriptive experts.

Which of the above statements is/are correct?
(A) 2 and 3
(B) 1, 2, and 4
(C) 1 and 2
(D) 1 and 4

67. Which of the following statements regarding the limitations of the Triangle test is incorrect?
(A) It is less efficient than the duo-trio test because the guessing probability is higher in the triangle test.
(B) It is highly susceptible to sensory fatigue and memory effects because the panelist must evaluate three samples.
(C) It is generally unsuitable for products with strong, lingering flavors like chili or menthol.
(D) It only indicates whether a difference exists, not the nature or direction of that difference.

68. Given below are steps involved in conducting a Triangle Test:
1. Present the three coded samples to the panelist simultaneously or sequentially.
2. Formulate the null hypothesis (no difference exists) and alternative hypothesis.
3. Determine the number of correct responses required for statistical significance using binomial tables.
4. Panelist evaluates the samples and identifies the odd sample.

Arrange these steps in the correct logical sequence.
(A) 1, 4, 2, 3
(B) 2, 3, 1, 4
(C) 1, 2, 4, 3
(D) 2, 1, 4, 3

69. A food company is forced to change its vanilla extract supplier due to supply chain issues. The new extract is slightly cheaper, and the company wants to ensure that regular consumers will not notice any difference in their vanilla ice cream. Which sensory test is the most appropriate to use?
(A) Quantitative Descriptive Analysis (QDA)
(B) Triangle test or Duo-trio test
(C) Hedonic scale rating
(D) Just-About-Right (JAR) scale

70. Given below are two statements:
Statement I: The Triangle test is statistically more powerful than the Duo-trio test for a given number of panelists because the probability of guessing correctly by chance is lower.
Statement II: In both Triangle and Duo-trio tests, a "no difference" result definitively proves that the two products are chemically identical.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

71. A quality control department needs to conduct a difference test on a highly pungent and lingering spicy sauce. To minimize severe sensory fatigue and carryover effects, which application of discrimination testing is the best choice?
(A) Triangle test for overall difference detection
(B) Consensus Flavour Profile Method evaluation
(C) Quantitative Descriptive Analysis profiling
(D) Simple Paired Comparison same/different test

72. Identify the incorrect pair regarding sensory discrimination tests and general panelist requirements.
(A) Descriptive analysis — Requires a minimum of 100 completely untrained consumers.
(B) Triangle test — Requires 20-40 untrained or semi-trained panelists for statistical reliability.
(C) Directional paired comparison — Can be conducted with untrained panelists if the attribute is easily understood (e.g., sweetness).
(D) Duo-trio test — Often preferred over the triangle test for complex flavors due to lower memory requirement.

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73. In which of the following scenarios is the "A-not-A" test the most appropriate choice over a triangle or duo-trio test?
(A) When evaluating multiple visual appearance attributes simultaneously to establish a complete product quality profile.
(B) When samples cannot be presented simultaneously due to strong lingering aftertastes or specific evaluation conditions.
(C) When determining the exact consumer preference and national purchase intent ratio between two major competitor brands.
(D) When generating a highly detailed descriptive lexicon of sensory terms and reference standards for a novel food product.

74. Identify the correct pair regarding hypothesis testing in a discrimination test.
(A) Null Hypothesis (H0) — The two sample types are perceptibly different in their sensory attributes.
(B) Type I Error (Alpha) — Concluding a difference exists when, in reality, no difference exists.
(C) Alternative Hypothesis (Ha) — The two sample types are perceptibly identical in all characteristics.
(D) Type II Error (Beta) — Concluding no difference exists when a real sensory difference actually exists.

75. When analyzing the results of a Triangle test, the statistical significance of the data is typically determined using critical value tables derived from which probability distribution?
(A) Binomial distribution
(B) Normal (Gaussian) distribution
(C) Poisson distribution
(D) Exponential distribution

76. Which of the following defines "Flavour Profile Method" in descriptive sensory analysis?
(A) An affective consumer preference test where untrained individuals rank flavor profiles from most preferred to least preferred.
(B) An instrumental gas chromatography method used to objectively isolate and quantify volatile aromatic chemical compounds.
(C) A consensus-based descriptive technique evaluating overall impression, specific flavor notes, intensities, and order of appearance.
(D) An analytical discrimination test designed specifically to determine the absolute detection threshold of a single flavor compound.

77. The following question consists of two statements, one labeled as Assertion (A) and the other as Reason (R). Choose the correct option:
Assertion (A): Affective or hedonic sensory tests require large groups of untrained consumers.
Reason (R): The objective of affective testing is to gauge personal preference and market acceptance, which reflects the subjective opinions of the general target population.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

78. Which of the following is NOT typically evaluated as a standard parameter in instrumental Texture Profile Analysis (TPA) derived sensory descriptors?
(A) Hardness
(B) Springiness
(C) Hue
(D) Chewiness

79. Match List I with List II and select the correct option:
List I: (Descriptive Analysis Methodology)
P. Quantitative Descriptive Analysis (QDA)
Q. Flavour Profile Method (FPM)
R. Texture Profile Method
S. Spectrum Method
List II: (Defining Characteristic)
I. Employs a consensus approach to generate a profile without statistical variance.
II. Uses extensive calibration to absolute reference standards to provide absolute intensity values.
III. Focuses exclusively on rheological and mechanical characteristics during mastication.
IV. Uses an unstructured line scale and relies on panel leader as a facilitator, analyzing data statistically (e.g., spider plots).
(A) P-I, Q-IV, R-II, S-III
(B) P-IV, Q-I, R-III, S-II
(C) P-IV, Q-II, R-III, S-I
(D) P-II, Q-I, R-III, S-IV

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80. Which of the following statements correctly identifies a core principle of Quantitative Descriptive Analysis (QDA)?
(A) The sensory panel leader actively participates in evaluating the samples and dictates the final consensus scores.
(B) It requires absolutely no pre-test training, as it aims to capture naive consumer vocabulary and preferences.
(C) It is used solely to determine if a statistically significant difference exists between two commercial samples.
(D) Panelists evaluate products in isolated booths on unstructured line scales, and data is analyzed using ANOVA.

81. Given below are some statements regarding affective (hedonic) sensory testing:
1. Preference testing asks the consumer which sample they like better.
2. Acceptance testing measures the degree of liking for a product on a rating scale.
3. Hedonic tests are typically conducted using highly trained descriptive expert panels.
4. A minimum of 75-100 consumers is generally recommended for reliable affective testing.

Which of the above statements is/are correct?
(A) 1, 2, and 4
(B) 1, 2, and 3
(C) 2, 3, and 4
(D) 1, 3, and 4

82. Which of the following statements about consumer testing sample sizes and demographics is incorrect?
(A) The consumer panel must represent the product's specific target demographic profile.
(B) Affective tests require larger sample sizes due to high human preference variability.
(C) Preference testing with a 10-member expert panel accurately reflects broad market success.
(D) Screening consumers for food allergies is a critical safety step before active testing.

83. A food company conducts descriptive profiling on a batch of mayonnaise over 6 months of storage at ambient temperature. Over time, the "rancid/oxidized" attribute score increases significantly while the "creamy" attribute score decreases. Which cause-and-effect relationship does this sensory data most directly support?
(A) Cause: Lipid oxidation; Effect: Establishing sensory shelf-life based on descriptive data.
(B) Cause: Emulsion stability; Effect: Significant increase in consumer preference over time.
(C) Cause: Microbial fermentation; Effect: Systematic decrease in overall rancidity scores.
(D) Cause: Maillard browning; Effect: Improvement in visual texture and mouthfeel scores.

84. A sensory scientist compiles the data from a QDA panel evaluating a new craft beer. The scientist plots the mean intensity scores for attributes like bitterness, maltiness, floral aroma, and astringency on a multi-axis radial graph. What is this common visual representation called?
(A) Standard Pareto Quality Chart
(B) Classical bivariate scatter plot
(C) Cause-and-effect Ishikawa diagram
(D) Spider web plot (Radar chart)

85. Given below are two statements:
Statement I: In a paired preference test, a consumer is presented with two samples and asked to identify which one they prefer.
Statement II: A ranking for preference test allows consumers to order three or more samples based on their degree of liking.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

86. A company has developed a new meal replacement shake that requires specific preparation (mixing with milk and blending with ice) and wishes to know how families react to it in their normal daily routine over a week. Which test format is most applicable?
(A) Central Location Test (CLT)
(B) Focus Group in a sensory lab
(C) Home Use Test (HUT)
(D) Triangle difference test

87. Identify the incorrect pair of terminology used in descriptive sensory analysis and its meaning.
(A) Lexicon — A standardized vocabulary of sensory attributes developed to describe a product category.

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(B) Reference Standard — A physical chemical or product used to anchor a specific intensity on a sensory scale.
(C) Order of appearance — The sequence in which different flavor notes are perceived during mastication and swallowing.
(D) Amplitude — The specific off-flavor developed during the storage of fatty foods.

88. Which of the following is the most appropriate test to determine the overall acceptability and degree of liking of a newly formulated mango juice among the general public?
(A) 9-point Hedonic scale rating
(B) Flavour Profile Method
(C) Duo-trio test
(D) Paired comparison test

89. Identify the correct pair of a hedonic test and the type of data it primarily generates.
(A) 9-point hedonic scale — Nominal data representing food categories without any intrinsic order
(B) Preference ranking — Ordinal data representing ranked order without magnitude of difference
(C) Paired preference — Ratio data possessing a true mathematical zero point for comparison
(D) Triangle difference test — Interval data containing equal distances between individual scores

90. In the Flavour Profile Method, what does the term "Amplitude" refer to?
(A) The maximum physical force required to completely bite through a solid sample.
(B) The overall impression of balance and blending of the individual flavor notes.
(C) The physical length of the unstructured line scale used for sample scoring.
(D) The statistical variance of the panel's descriptive scores across sessions.

91. Which of the following correctly defines the standard 9-point Hedonic Scale used in sensory evaluation?
(A) A balanced bipolar scale centered on a neutral category, with four degrees of liking and four of disliking.
(B) A continuous line scale measuring the exact physical intensity of sweetness from a minimum of 0 to a maximum of 9.
(C) A highly structured scale used exclusively by expert panels to rank the commercial shelf-life of food products.
(D) A strictly nominal scale used to categorize food items into nine distinct and unrelated flavor and taste groups.

92. The following question consists of two statements, one labeled as Assertion (A) and the other as Reason (R). Choose the correct option:
Assertion (A): Just-About-Right (JAR) scales are often combined with penalty analysis (mean drop analysis) in consumer sensory research.
Reason (R): Penalty analysis determines how much a product's overall acceptability score drops when consumers rate a specific attribute (e.g., saltiness) as "too strong" or "too weak" on the JAR scale.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

93. Which of the following is NOT a characteristic of a Line Scale (Visual Analogue Scale) used in descriptive sensory analysis?
(A) It consists of a straight line of specified physical length, typically 15 cm.
(B) It is anchored at the ends with descriptive words such as 'weak' and 'strong'.
(C) Panelists mark a point on the line corresponding to their perceived intensity.
(D) Panelists are restricted to selecting one of exactly five discrete numbers.

94. Match List I with List II and select the correct option:
List I: (Type of Data/Scale)
P. Nominal scale
Q. Ordinal scale
R. Interval/Ratio scale
S. JAR scale
List II: (Sensory Application Example)
I. Ranking three juice samples from most to least preferred.
II. Categorizing a defect type (e.g., burned, undercooked, raw).
III. Measuring the exact magnitude of firmness using a calibrated 15-cm line scale.
IV. Evaluating if the carbonation level in a soda is "too low", "optimal", or "too high".
(A) P-I, Q-II, R-IV, S-III

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(B) P-IV, Q-III, R-II, S-I
(C) P-II, Q-I, R-III, S-IV
(D) P-II, Q-IV, R-I, S-III

95. Which of the following statements correctly identifies the application of Analysis of Variance (ANOVA) in sensory data analysis?
(A) ANOVA is used primarily to determine the statistical significance of categorical data obtained from a triangle test.
(B) ANOVA evaluates if there are significant differences between the mean sensory scores of three or more samples.
(C) ANOVA is a qualitative brainstorming tool used to build the descriptive lexicon for trained sensory panels.
(D) ANOVA is used exclusively to measure the mechanical viscosity and flow rate of non-Newtonian food fluids.

96. Given below are some statements regarding Principal Component Analysis (PCA) in sensory science:
1. PCA is a multivariate statistical technique used to reduce the dimensionality of complex descriptive sensory data sets.
2. PCA creates new variables (principal components) that explain the maximum variance in the data.
3. A PCA biplot visualizes the relationship between different products and their sensory attributes on a two-dimensional graph.
4. PCA requires all sensory data to be binary (pass/fail).

Which of the above statements is/are correct?
(A) 1, 3, and 4
(B) 2, 3, and 4
(C) 1, 2, and 4
(D) 1, 2, and 3

97. Which of the following statements regarding the statistical analysis of sensory data is incorrect?
(A) Post-hoc tests (like Tukey's HSD) are run before ANOVA to check if the data is suitable for analysis.
(B) Parametric tests like ANOVA assume that the data is normally distributed and variances are relatively equal.
(C) Non-parametric tests (like the Kruskal-Wallis test) are used when data heavily violates the assumptions of normal distribution.
(D) In hypothesis testing, a p-value less than the significance level (e.g., $p < 0.05$) indicates a statistically significant difference.

98. Given below are steps in evaluating sensory descriptive data using ANOVA and subsequent analysis:
1. Conduct post-hoc means separation testing (e.g., Tukey's HSD) if significant differences are found.
2. Collect intensity ratings from the trained panel for multiple products.
3. Check data for normality and homogeneity of variance.
4. Run ANOVA to determine if there is a significant product effect ($p < 0.05$).

Arrange these steps in the correct general sequence.
(A) 3, 2, 4, 1
(B) 2, 4, 3, 1
(C) 2, 3, 4, 1
(D) 4, 1, 2, 3

99. A sensory researcher runs an ANOVA on the hedonic scores of 4 different cookies and finds a p-value of 0.02. To identify exactly which specific cookie is significantly preferred over the others, which statistical procedure should be applied next?
(A) Tukey's Honestly Significant Difference (HSD) post-hoc test
(B) Student's t-test comparing all sample pairs simultaneously
(C) Classical Principal Component Analysis dimension mapping
(D) Standard binomial distribution probability significance test

100. Given below are two statements:
Statement I: In sensory statistics, a Type I error occurs when the researcher concludes there is a significant difference between samples, but in reality, there is no difference (false positive).
Statement II: A Type II error occurs when the researcher concludes there is no significant difference, but a real difference actually exists (false negative).
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

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101. When interpreting a PCA biplot of sensory data for various apple cultivars, Cultivar X and Cultivar Y are plotted very close to each other, and both are situated far along the vector for the "Crispness" attribute. What is the correct interpretation?
(A) Cultivars X and Y are sensory opposites; X is very crisp and Y is extremely soft.
(B) Cultivars X and Y have similar sensory profiles and are highly rated for crispness.
(C) The crispness attribute does not explain any of the variance between the apple samples.
(D) Cultivars X and Y are significantly different in all attributes except for crispness.

102. Identify the incorrect pair of a statistical concept and its definition in sensory analysis.
(A) Null Hypothesis — The assumption that there is no true difference between the populations being compared.
(B) p-value — The probability of obtaining the observed results assuming the null hypothesis is true.
(C) Significance Level (Alpha) — The probability of making a Type II error (false negative).
(D) Variance — A measure of the spread or dispersion of a set of scores around their mean.

103. Which of the following rating scales is most appropriate for a highly trained Quantitative Descriptive Analysis (QDA) panel measuring the intensity of 'astringency' in tea?
(A) Standard 9-point Hedonic preference acceptance scale
(B) Just-About-Right (JAR) diagnostic attribute scale
(C) 3-point categorical intensity scale
(D) 15-cm unstructured line scale with anchors

104. Identify the correct pair of an experimental design term and its application in sensory evaluation.
(A) Randomized Complete Block Design (RCBD) — Every panelist evaluates all samples in a randomized order.
(B) Completely Randomized Design (CRD) — Sensory panels where no randomization is applied to presentation order.
(C) Latin Square Design — A unique design used exclusively to test only one single product across sessions.
(D) Balanced Incomplete Block Design (BIBD) — Every panelist evaluates all samples, creating a complete block.

105. Who is credited with the development of the 9-point hedonic scale while conducting research for the U.S. Armed Forces Quartermaster Food and Container Institute?
(A) S.S. Stevens
(B) David Peryam and Norman Girardot
(C) Rose Marie Pangborn
(D) Arthur Kramer

106. Which of the following defines Instrumental Texture Profile Analysis (TPA)?
(A) An instrumental technique involving a single puncture test to measure the yield stress of a non-Newtonian fluid.
(B) A double compression mechanical test designed to simulate chewing and extract multiple texture parameters.
(C) An acoustic measurement of the sound frequency emitted when brittle food breaks during mechanical compression.
(D) A chemical assay measuring the exact concentration of pectin and structural cellulose inside plant tissues.

107. The following question consists of two statements, one labeled as Assertion (A) and the other as Reason (R). Choose the correct option:
Assertion (A): The CIE $L^*a^*b^*$ colour space is a three-dimensional model widely used in the food industry to objectively quantify food colour.
Reason (R): The $L^*a^*b^*$ model was designed to be device-independent and perceptually uniform, meaning a numerical difference in color values closely aligns with the human eye's perception of color difference.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

108. Which of the following is NOT a standard parameter calculated from the force-time curve generated during instrumental Texture Profile Analysis (TPA)?
(A) Hardness
(B) Springiness
(C) Viscosity
(D) Cohesiveness

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109. Match List I with List II and select the correct option:

List I: (Instrumental TPA Parameter)

P. Hardness
Q. Cohesiveness
R. Springiness
S. Chewiness

List II: (Physical Derivation)

I. The ratio of the positive force area during the second compression to that of the first compression (Area 2 / Area 1).
II. The peak force achieved during the first compression cycle.
III. The product of Hardness × Cohesiveness × Springiness.
IV. The height the sample recovers between the end of the first bite and the start of the second bite.

(A) P-I, Q-II, R-III, S-IV
(B) P-II, Q-IV, R-I, S-III
(C) P-IV, Q-I, R-II, S-III
(D) P-II, Q-I, R-IV, S-III

110. Which statement correctly describes the coordinate meanings in the CIE $L^* a^* b^*$ colour space?

(A) L* represents lightness (0=white, 100=black); a* represents yellow/blue; b* represents red/green.
(B) L* represents the hue angle; a* represents chroma (saturation); b* represents overall lightness.
(C) L* represents lightness (0=black, 100=white); a* represents red/green; b* represents yellow/blue.
(D) L* represents red; a* represents green; b* represents blue in the standard RGB coordinate system.

111. Given below are some statements regarding shear force measurements (e.g., Warner-Bratzler shear):

1. It is primarily used to objectively evaluate the tenderness of meat.
2. It measures the maximum force required to shear a meat sample across its muscle fibers.
3. A higher shear force value indicates a more tender meat sample.
4. It is widely recognized as a standard instrumental method in the meat industry.

Which of the above statements is/are correct?

(A) 1, 3, and 4
(B) 1, 2, and 4
(C) 2, 3, and 4
(D) 1, 2, and 3

112. Which of the following statements regarding fluid viscosity measurement is incorrect?

(A) A Newtonian fluid's viscosity remains constant regardless of the applied shear rate.
(B) Water and clear fruit juices are typical examples of Newtonian fluids.
(C) Rotational viscometers (e.g., Brookfield) are commonly used to measure the apparent viscosity of non-Newtonian food liquids.
(D) Ketchup is a dilatant (shear-thickening) fluid, meaning its viscosity increases rapidly when stirred or shaken.

113. A quality control lab evaluates the color of a batch of tomato paste against a standard using human vision under fluorescent lab lights and determines they match perfectly. However, the customer complains the paste looks significantly more orange than the standard when viewed under natural daylight. What optical phenomenon causes this effect?

(A) Metamerism
(B) Fluorescence
(C) Rayleigh scattering
(D) Dichromatism

114. A food scientist wants to validate a new instrumental texture analyzer setup by correlating its data with human sensory perception of cheddar cheese. Which approach is statistically most robust?

(A) Correlate the instrumental hardness (peak force) directly with subjective hedonic preference scores of untrained consumers.
(B) Compare the instrument's springiness data with the sensory panel's aroma intensity scores across different storage times.
(C) Perform a Pearson correlation or PLS regression between instrumental hardness and the descriptive panel's firmness scores.
(D) Avoid statistical correlation altogether, as machines and humans measure completely unrelated physical sensory phenomena.

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115. Given below are two statements:

Statement I: Tristimulus colorimeters measure color by filtering light into three broad spectral bands matching the color matching functions of the human eye.

Statement II: Spectrophotometers measure the

exact spectral reflectance or transmittance of an object at narrow wavelength intervals across the entire visible spectrum, offering more precise color data.

(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

116. A production line for tomato ketchup utilizes a Bostwick consistometer for routine hourly quality checks. What specific rheological property is this simple empirical instrument practically assessing?

(A) The exact dynamic viscosity measured in centipoise under highly controlled shear rates.
(B) The mechanical tensile strength of the internal structural tomato ketchup network.
(C) The true structural yield stress of the fluid using advanced oscillatory rheometry.
(D) The consistency based on the flow distance under its own weight in a given time.

117. Identify the incorrect pair of an instrumental texture measuring device and its primary application in the food industry.

(A) Farinograph — Measuring the water absorption and mixing characteristics of wheat flour dough.
(B) Warner-Bratzler shear blade — Measuring the spreadability of butter and margarine.
(C) Penetrometer — Measuring the firmness of fruits or consistency of fats.
(D) Bloom gelometer — Measuring the gel strength of gelatin.

118. Which of the following instrumental setups is most appropriate for measuring the texture (firmness/softness) of baked bread crumb?

(A) High-shear rotational viscometry for fluid flow characterization
(B) Capillary extrusion measurement of high-viscosity food materials
(C) A uniaxial compression test using a standard cylinder probe
(D) Bostwick consistometer gravity flow test for fluid consistency

119. Identify the correct pair of a viscometer type and its fundamental operating principle.

(A) Rotational viscometer — Measures the acoustic sound wave velocity passing through a fluid matrix.
(B) Falling ball viscometer — Measures the torque required to rotate a spindle at constant speed.
(C) Bostwick consistometer — Measures the absolute kinematic viscosity of non-Newtonian fluids in Stokes.
(D) Capillary viscometer — Measures the flow time of a fluid through a narrow tube under gravity.

120. While both the Hunter L, a, b and CIE L^*, a^*, b^* scales represent color in three dimensions, what is the primary structural difference between the mathematical models of the two systems?

(A) CIE Lab uses cube roots for perceptual uniformity, while Hunter Lab uses square roots.
(B) Hunter Lab uses RGB color coordinates, whereas CIE Lab uses CMYK printing coordinates.
(C) CIE Lab only measures lightness values, while Hunter Lab only measures hue and saturation.
(D) There is no mathematical difference; they are different brand names for the same equations.

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121. Which of the following defines Quality Assurance (QA) in the context of food manufacturing?

(A) The routine operational testing of finished products on the manufacturing floor to identify and segregate defective units.
(B) A proactive, process-oriented system focused on defect prevention through planning, documentation, and process design.
(C) The statistical sampling plan used by national regulatory agencies during official factory food safety inspections.
(D) The reactive customer service process of resolving individual consumer complaints by issuing direct financial refunds.

122. The following question consists of two statements, one labeled as Assertion (A) and the other as Reason (R). Choose the correct option:

Assertion (A): Quality Assurance (QA) is considered a proactive system, whereas Quality Control (QC) is considered a reactive function.

Reason (R): QA focuses on establishing standardized processes and preventing defects before they occur, while QC focuses on identifying and sorting out defects in the finished product after manufacturing.

(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

123. Which of the following is NOT one of the classic "Seven Basic Quality Control Tools" popularized by Kaoru Ishikawa?

(A) Principal Component Analysis
(B) Standardized Pareto Chart
(C) Cause-and-Effect Diagram
(D) Statistical Control Chart

124. Match List I with List II and select the correct option:

List I: (QC Tool)
P. Pareto Chart
Q. Ishikawa Diagram
R. Control Chart
S. Scatter Diagram

List II: (Primary Function)
I. To systematically brainstorm and map out root causes of a specific quality problem.
II. To monitor process variation over time and detect out-of-control conditions.
III. To identify the relationship or correlation between two different variables.
IV. To prioritize quality problems based on the principle that 80% of issues stem from 20% of causes.

(A) P-I, Q-IV, R-III, S-II
(B) P-IV, Q-II, R-I, S-III
(C) P-IV, Q-I, R-II, S-III
(D) P-II, Q-I, R-IV, S-III

125. Which statement correctly describes the primary purpose of Standard Operating Procedures (SOPs) within a QA system?

(A) SOPs are complex mathematical formulas used to calculate the capability index of a production machine.
(B) SOPs are legal contracts signed strictly between a commercial food manufacturer and the final consumer.
(C) SOPs are accounting methodologies used solely for the internal financial tracking of quality costs.
(D) SOPs provide step-by-step written instructions to help workers consistently carry out routine operations.

126. Given below are some statements regarding audit procedures in a QA system:

1. First-party audits are internal audits conducted by the organization on its own systems.
2. Second-party audits are conducted by a customer on their supplier to ensure requirements are met.
3. Third-party audits are conducted by independent, external certification bodies (e.g., for ISO 22000 or BRCGS).
4. Audits are primarily designed to find individual employees to punish for production errors.

Which of the above statements is/are correct?

(A) 1, 3, and 4
(B) 2, 3, and 4
(C) 1, 2, and 3
(D) 1, 2, and 4

127. Which of the following statements regarding the interpretation of statistical control charts is incorrect?

(A) The control limits (UCL and LCL) are typically set at ± 3 standard deviations from the mean.
(B) A process is in control if 7 consecutive points continuously increase within control limits.
(C) Data points falling outside control limits indicate the presence of special cause variation.
(D) Natural, common cause variation occurs randomly within control limits when the process is stable.

128. Given below are steps for constructing a Cause-and-Effect (Fishbone) diagram to solve a quality issue:

1. Define the specific quality problem (the "Effect") clearly at the head of the diagram.
2. Brainstorm specific detailed causes for each category and attach them as sub-branches.
3. Analyze the diagram to identify the most probable root cause for further investigation.
4. Identify the major categories of potential causes (e.g., the 5Ms: Man, Machine, Material, Method, Measurement) as main branches.

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Arrange these steps in the correct logical sequence.
(A) 4, 1, 2, 3
(B) 1, 2, 4, 3
(C) 2, 1, 4, 3
(D) 1, 4, 2, 3

129. A bakery notices a high rate of rejected bread loaves over a month. They categorize the defects: 70% underweight, 15% burnt crust, 10% poor shape, and 5% foreign matter. Applying the Pareto principle, what is the most appropriate management action?
(A) Focus investigative resources on the "underweight" defect, as it constitutes the vital few causes of rejections.
(B) Allocate equal financial resources to investigate and resolve all four defect categories simultaneously.
(C) Focus primarily on the "foreign matter" defect because it involves safety, ignoring the other three defects.
(D) Ignore the collected data entirely and simply increase the oven baking temperature to solve the crust issue.

130. Given below are two statements:
Statement I: Quality Assurance systems rely heavily on robust documentation, including policies, manuals, procedures, and records, to provide objective evidence of compliance.
Statement II: Quality Control relies entirely on verbal communication on the factory floor and does not require any documented records of test results.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

131. In a formalized QA document control system, what is the necessary procedure when an SOP needs to be updated because of a change in processing equipment?
(A) A change request is approved, the document is updated with a new revision, and obsolete copies are removed.
(B) The machine operator writes the new operating instructions by hand directly on the existing posted paper copy.
(C) The old SOP is thrown away, and operators are told verbally by the supervisor how to use the new equipment.
(D) The QA manager emails the official equipment manufacturer manual to all staff, replacing the original SOP.

132. Identify the incorrect pair of an audit term and its definition.
(A) Non-conformance — A failure to fulfill a specified requirement or standard.
(B) Objective evidence — Data, records, or facts supporting the existence or verity of something, verified during an audit.
(C) Corrective action — Action taken to eliminate the cause of a detected non-conformity and prevent recurrence.
(D) Preventive action — Action taken merely to fix or rework a defective product that has already been produced.

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133. Which of the following is the most appropriate primary benefit of implementing a robust, proactive Quality Assurance (QA) system rather than relying solely on end-product Quality Control (QC)?
(A) It completely eliminates any operational need for purchasing expensive laboratory testing equipment.
(B) It reduces costs associated with scrap, rework, and product recalls by building quality into the process.
(C) It allows the manufacturing company to completely bypass all mandatory regulatory safety inspections.
(D) It guarantees that consumers will inherently prefer the taste of the food product over all competitors.

134. Identify the correct pair of a QC tool and its alternative naming convention.
(A) Pareto chart — Standardized operational manufacturing flowchart
(B) Scatter diagram — Classical statistical frequency data histogram
(C) Cause-and-Effect diagram — Ishikawa or Fishbone diagram
(D) Control chart — Operational quality check sheet for data entry

135. The fundamental continuous improvement framework utilized in Quality Management,

consisting of Plan, Do, Check, Act, is widely known as the:
(A) Juran Trilogy
(B) Crosby Absolute
(C) Taguchi Loss Function
(D) Deming Cycle (PDCA)

136. Which of the following defines Statistical Process Control (SPC)?
(A) The application of statistical techniques to monitor and control a process to ensure conforming products.
(B) The use of statistics purely to design, distribute, and analyze consumer marketing opinion surveys.
(C) The financial auditing method used to calculate the overall profit margins of a manufactured batch.
(D) A manual sorting technique where every single produced food item is visually inspected by operators.

137. The following question consists of two statements, one labeled as Assertion (A) and the other as Reason (R). Choose the correct option:
Assertion (A): Investing heavily in prevention costs (like training and process engineering) typically reduces total quality costs in the long run.
Reason (R): High prevention costs lead to a drastic reduction in both internal and external failure costs, which are generally much more expensive to remediate.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

138. Which of the following is NOT an example of an "internal failure cost" in the Cost of Quality model?
(A) Reworking a batch of poorly mixed dough
(B) Processing consumer product returns and issuing refunds
(C) Scrapping packaging material due to misprinting
(D) Disposing of an over-processed batch of juice before it leaves the factory

139. Match List I with List II and select the correct option:
List I: (Cost of Quality Category)
P. Prevention Cost
Q. Appraisal Cost
R. Internal Failure Cost
S. External Failure Cost
List II: (Example)
I. Conducting routine laboratory testing on raw materials
II. Product recall logistics and legal settlements
III. Training operators on a new hygiene standard operating procedure
IV. Downgrading and selling off-spec product as animal feed
(A) P-III, Q-I, R-IV, S-II
(B) P-I, Q-III, R-II, S-IV
(C) P-III, Q-IV, R-I, S-II
(D) P-II, Q-I, R-IV, S-III

140. Which statement correctly outlines the best practice for handling consumer quality complaints?
(A) Complaints should be filed away unless the consumer formally threatens the company with legal action.
(B) Complaints indicate external failure but do not require integration into the internal QA improvement loop.
(C) Each complaint should trigger a root cause investigation followed by corrective action to prevent recurrence.
(D) The customer service team should deny the complaint initially to protect the brand's public reputation.

141. Given below are some statements regarding Supplier Quality Management and raw material specifications:
1. Clear, documented raw material specifications act as the agreed baseline for acceptance or rejection between supplier and buyer.
2. Relying solely on a Certificate of Analysis (CoA) from a new, unapproved supplier without any internal verification is an industry best practice.
3. Conducting supplier audits helps assess the supplier's capability to consistently meet quality requirements.
4. Supplier performance should be routinely tracked using metrics like defect rate and on-time delivery.
Which of the above statements is/are correct?
(A) 1, 2, and 3

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(B) 2, 3, and 4
(C) 1, 2, and 4
(D) 1, 3, and 4

142. Which of the following statements comparing in-process quality monitoring and end-product testing is incorrect?
(A) In-process monitoring allows real-time adjustments before a large amount of defect is manufactured.
(B) Modern QA systems place greater emphasis on process control rather than end-product testing alone.
(C) End-product testing efficiently catches every single defective unit in a run via random sampling.
(D) In-process monitoring variables include physical parameters such as temperature, pressure, and pH.

143. A food manufacturer implements a rigorous supplier approval program, including onsite audits and strict raw material specifications. What is the most likely operational consequence of this action regarding incoming goods?
(A) Cause: Improved supplier reliability; Effect: Increased administrative need for 100% incoming raw material inspection.
(B) Cause: Assured supplier capability; Effect: Reduced frequency of incoming raw material testing via skip-lot sampling.
(C) Cause: Higher quality raw materials; Effect: Total elimination of all subsequent internal product processing steps.
(D) Cause: Stricter specifications; Effect: Guaranteed zero external failures during subsequent commercial distribution.

144. A major dairy company issues a nationwide recall for yogurt due to the presence of undeclared allergens caused by cross-contamination in the factory. In the Cost of Quality framework, how are the expenses related to this recall categorized?
(A) Appraisal costs
(B) Prevention costs
(C) Internal failure costs
(D) External failure costs

145. Given below are two statements:
Statement I: Corrective Action involves identifying and eliminating the root cause of an existing non-conformity to prevent it from happening again.
Statement II: Preventive Action involves identifying potential non-conformities before they occur and taking action to prevent their initial occurrence.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

146. A food safety manager wants to ensure top management is actively engaged in the QA system's effectiveness. Which standard internal process is designed specifically to present audit results, complaint trends, and process performance to top management for strategic resource allocation?
(A) Hazard Analysis (HACCP) team meeting
(B) Daily production huddle
(C) Management Review meeting
(D) Supplier negotiation meeting

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147. Identify the incorrect pair regarding process capability indices used in Statistical Process Control.
(A) Cp < 1.0 — Indicates the process variation is significantly tighter than the specification limits, guaranteeing zero defects.
(B) Cp (Process Capability) — Measures the potential capability of a process based on the width of the specification limits relative to process spread, ignoring centering.
(C) Cpk (Process Capability Index) — Measures the actual capability of a process, taking into account both process spread and process centering relative to specifications.
(D) Cpk > 1.33 — Generally indicates a highly capable process that meets industry quality standards.

148. Which of the following is the most appropriate proactive approach a food manufacturer should take before accepting bulk shipments of a critical functional ingredient (like a specialized hydrocolloid) from a new supplier?
(A) Accept the first three shipments blindly, and if final product fails, quickly switch to another supplier.
(B) Rely entirely on the supplier's promotional marketing brochure regarding the

ingredient's chemical purity.

(C) Perform a complete, 100% analytical chemical breakdown of every single raw material bag in the shipment.

(D) Test a pre-shipment sample, audit the supplier, and sign a specification agreement prior to purchase.

149. Identify the correct pair of a variation type in SPC and its fundamental characteristic.

(A) Common cause variation — Caused by highly erratic, unpredictable events like sudden power outages.

(B) Special cause variation — Signals the process is out of control and requires immediate investigation.

(C) Special cause variation — Inherent to process design, always present, and forms stable distributions.

(D) Common cause variation — Can be eliminated entirely by telling operators to work much more carefully.

150. In the context of Quality Assurance and food safety, the ability to track any food, feed, food-producing animal, or substance that will be used for consumption through all stages of production, processing, and distribution is legally defined as:

(A) Transparency

(B) Root Cause Analysis

(C) Traceability

(D) Recall Logistics

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ANSWERS

1. (A) The sum of properties and characteristics that influence consumer acceptability
Food quality encompasses all features and characteristics of a food product that bear on its ability to satisfy stated or implied needs of consumers. It includes sensory characteristics like flavor and appearance, nutritional value, shelf-life, and safety. A comprehensive definition must integrate these diverse properties to determine overall user satisfaction and acceptance in the market.

2. (A) Both A and R are true and R is the correct explanation of A.
Convenience foods undergo intensive industrial processing, such as high-temperature sterilization, drying, or freezing, to achieve long shelf-life and quick preparation. This severe thermal exposure directly degrades sensitive, essential micronutrients, particularly water-soluble and heat-labile vitamins like vitamin C and thiamine, leading to a compromised nutritional profile compared to fresh, minimally processed raw food counterparts.

3. (A) Surface colour
Food quality attributes are classified as external or hidden. External attributes are easily perceived by the human senses, primarily sight, touch, and smell, prior to purchase or consumption. Surface color is a prominent external attribute immediately visible to consumers. Conversely, hidden attributes like nutritional value, microbiological safety, and chemical toxicity require analytical testing and are completely imperceptible.

4. (D) P-III, Q-I, R-IV, S-II
Sensory attributes like potato chip crispiness are evaluated directly by human senses during consumption. Safety attributes focus on the absence of hazards, such as dangerous heavy metals. Nutritional attributes involve chemical constituents like ascorbic acid content that provide health benefits. Convenience attributes are process-oriented features that make preparation easier, such as utilizing microwaveable packaging for fast cooking.

5. (B) The absence of pathogenic bacteria, natural toxins, and harmful chemical residues.
Safety attributes of food represent a critical, non-negotiable dimension of quality, signifying that the product is free from biological, chemical, or physical hazards that could cause consumer illness or injury. This requires the total absence of pathogenic microorganisms, hazardous chemical residues like pesticides or heavy metals, and naturally occurring biological toxins throughout the product shelf-life.

6. (C) 1, 2, and 4
Food quality cues include intrinsic factors belonging to the product physical makeup and extrinsic factors like price, brand, or packaging. Experience attributes can only be assessed by consumers during or after consumption, such as taste or tenderness. Credence attributes, like organic certification or safety, cannot be verified easily even after consumption and require external validation.

7. (D) Food processing always negatively impacts the nutritional quality of a food product.
While some food processing operations degrade heat-sensitive nutrients, processing is not universally detrimental to food quality. Many thermal and mechanical treatments actually enhance digestibility, inactivate naturally occurring anti-nutritional factors, release bound nutrients from cellular matrices, and allow for the essential fortification of staple foods, thereby improving the overall nutritional and physiological value of the diet.

8. (A) 2, 4, 1, 3
During food consumption, sensory perception follows a logical, chronological sequence of physiological interactions. A consumer first visualizes the product appearance and color. As the food is brought closer, volatile compounds are sniffed, evoking odor and aroma. Upon placing food in the mouth, soluble compounds stimulate taste receptors, followed by mastication which registers mechanical texture and kinesthetics.

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9. (B) It fails sensory quality standards but meets safety quality standards.
Food safety and sensory appeal are distinct dimensions of food quality. In this scenario, the apple juice is biochemically safe and free from pathogenic or chemical hazards, fulfilling all safety requirements. However, enzymatic browning alters the visual appearance, making the product unappealing to consumers. Thus, the batch fails sensory expectations while simultaneously meeting all safety standards.

10. (C) Statement I is correct but Statement II is incorrect.
Shelf-life defines the period during which a food product maintains acceptable sensory, nutritional, and microbiological quality under specified storage conditions. However, expiration dates do not offer an absolute guarantee of microbiological safety if storage conditions, such as temperature control, are violated. Temperature abuse allows rapid pathogen growth, rendering the food dangerous before the printed date.

11. (A) Convenience quality
Food packaging modifications often target the convenience quality dimension, which focuses on ease of use, storage, portioning, and preparation for consumers. Replacing a heavy, breakable glass bottle with a lightweight, flexible, and squeeze-friendly plastic pouch directly enhances portability, dispensability, and handling convenience during daily use, while having no immediate effect on intrinsic nutritional or sensory properties.

12. (C) Maillard reaction during baking — Complete loss of structural dietary fiber
The Maillard reaction is a chemical reaction between reducing sugars and amino acids that occurs during thermal processing like baking, producing color, aroma, and flavor. While it may slightly reduce essential amino acid bioavailability, it does not cause a complete loss of structural dietary fiber, which consists of complex carbohydrates that remain structurally stable during standard baking.

13. (D) Attributes that can only be ascertained by the consumer during or immediately after eating the food.
Experience attributes are specific quality characteristics of a food product that consumers cannot easily evaluate prior to purchase. These characteristics can only be determined through direct physiological interaction, specifically during the mastication and swallowing of the food. Typical examples of experience attributes include the sweetness of a fruit, chewiness of meat, and crispiness of snacks.

14. (C) Credence attribute — The organic certification of farm produce
Credence attributes represent quality characteristics that consumers cannot easily evaluate or verify themselves, even after consuming the food product. Verification of these attributes relies entirely on trust in third-party labeling, official certifications, or government inspections. Examples include organic farming claims, kosher or halal processing, animal welfare standards, and specific geographic designations of origin.

15. (B) Kramer and Twigg
This specific classical definition of food quality emphasizes that individual units of a product possess distinct physical and sensory characteristics that differentiate them. These differences directly determine how acceptable the product is to buyers. The definition was formally proposed by food scientists Kramer and Twigg, who established fundamental principles of quality control in the food industry.

16. (D) A scientific discipline used to evoke, measure, analyze, and interpret consumer reactions to characteristics of foods perceived by the senses.
Sensory evaluation is a formal scientific discipline defined by the Institute of Food Technologists. It establishes rigorous methodologies to evoke, measure, analyze, and interpret human physiological and psychological responses to products. By using humans as analytical instruments, it provides quantitative and qualitative insights into appearance, aroma, flavor, and texture characteristics under controlled, scientific experimental conditions.

17. (C) A is true but R is false.
The quality of incoming raw materials represents the absolute upper limit for the final quality of any processed food. Subsequent food processing techniques, such as pasteurization, freezing, or canning, can preserve quality and extend shelf-life, but they are completely incapable of reversing microbiological spoilage or restoring degraded, rotten, or poor-quality raw materials to their fresh state.

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18. (C) Method of blanching applied
Pre-harvest factors include genetic, environmental, and agronomic inputs that determine the raw material characteristics before harvesting. These comprise soil composition, climatic conditions, water availability, and cultivar genetics. Blanching is a post-harvest thermal processing step applied in industrial facilities to inactivate enzymes, and is therefore categorized as a processing factor rather than a pre-harvest agronomic variable.

19. (A) P-III, Q-II, R-IV, S-I
Exposure of tropical fruits to low non-freezing temperatures causes chilling injury, leading to surface pitting and discoloration. Severe thermal processing destroys heat-labile vitamins. Light exposure triggers photo-oxidation of fats and pigments, causing rancidity. High-shear mixing mechanical forces can destabilize emulsions, causing phase separation. These processing and storage variables directly dictate final product quality.

20. (D) Controlling relative humidity is crucial to prevent moisture loss in fresh produce and moisture gain in dry foods.
Relative humidity during storage directly influences the moisture equilibrium of foods. Fresh agricultural produce loses water to dry environments, leading to wilting, weight loss, and sensory degradation. Conversely, dry or hygroscopic foods absorb ambient moisture in humid environments, causing structural caking, clumping, and accelerated microbial growth. Controlling humidity is thus vital for maintaining optimal storage quality.

21. (B) 1, 3, and 4
Sensory evaluation is critical for product development, formulation optimization, shelf-life estimation, and quality control. Although instrumental methods provide highly precise measurements of specific chemical or physical parameters, they cannot fully replicate the complex human neurological integration of sensory inputs. Therefore, physical instruments cannot completely replace human sensory panels for determining consumer acceptance and product consistency.

22. (C) Evaluators are encouraged to use strong perfumes to mask any ambient laboratory odors.
The sensory testing environment must be highly controlled to prevent external bias. Evaluators must strictly avoid using perfumes, scented lotions, or smoking prior to testing, as these strong volatile compounds contaminate the testing area and mask subtle product aromas. Positive air pressure and active carbon filters are used to keep the booths entirely free from odors.

23. (D) Cause: Evaporation and degradation of volatile esters; Effect: Loss of natural fruit aroma and overall flavor alteration.
Strawberries contain highly volatile, heat-sensitive esters that provide their characteristic fresh, fruity aroma. During high-temperature thermal processing like jam making, these volatile molecules readily evaporate or chemically degrade. Consequently, the distinct fresh fruit flavor is lost, leaving behind non-volatile, stable compounds that produce a generic, cooked, or caramelized flavor profile in the final product.

24. (A) High levels of reducing sugars in the new variety causing excessive Maillard browning.
When potatoes are stored at low temperatures, starch can convert into reducing sugars like glucose and fructose. During high-temperature frying, these reducing sugars chemically react with free amino acids via the Maillard browning pathway. This rapid reaction produces excessive dark brown melanoidin pigments and bitter-tasting compounds, resulting in severe color and flavor defects in the chips.

25. (A) Both Statement I and Statement II are correct.
Sensory evaluation is unique because human subjects simultaneously integrate visual, olfactory, gustatory, and kinesthetic signals to perceive flavor and texture as a unified experience. In contrast, analytical laboratory instruments are designed to isolate and measure specific physical properties like viscosity or peak force, or chemical concentrations, without accounting for these complex, interactive human perceptual processes.

26. (B) High Pressure Processing (HPP)
High Pressure Processing is a non-thermal food preservation method that uses extreme hydrostatic pressure to inactivate vegetative pathogenic microorganisms. Because HPP does not apply heat, covalent bonds remain unaffected, leaving low-molecular-weight compounds like flavor molecules, pigments, and vitamins completely intact. This process preserves the fresh sensory

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and nutritional profile far better than conventional thermal pasteurization.

27. (A) Over-ripening of fruits — Increased firmness and tartness
As fruits over-ripen, cellular enzymes like pectin methylesterase and polygalacturonase degrade protopectin into soluble pectin, resulting in a dramatic loss of cell wall integrity and a softer, mushier texture. Simultaneously, organic acids are metabolized while starch converts to simple sugars, leading to decreased tartness and increased sweetness, rather than increased firmness and tartness.

28. (C) Instruments cannot replicate the complex psychological and physiological integration of perception experienced by human consumers.
While laboratory instruments provide precise, objective data on individual chemical or physical parameters, they are completely incapable of simulating how the human brain perceives and integrates multiple sensory signals simultaneously. Human sensory perception involves complex physiological interactions and cognitive expectations. Therefore, sensory evaluation remains an essential, irreplaceable methodology for assessing overall consumer acceptability and product flavor quality.

29. (D) Umami — Glutamate and specific ribonucleotides
Umami is a basic taste elicited primarily by L-glutamate and specific 5'-ribonucleotides, such as guanosine monophosphate and inosine monophosphate, which bind to specialized G-protein coupled receptors on the tongue. Other pairings are incorrect because astringency is caused by polyphenols precipitating salivary proteins, odors are elicited by volatile low-molecular-weight molecules, and crispness is a mechanical acoustic property.

30. (C) Halo effect
The halo effect is a common psychological error in sensory evaluation where a panelist's evaluation of one positive or negative product attribute biases their ratings of other, completely independent attributes. For instance, if a panelist strongly dislikes the color of a sample, they may subconsciously rate its flavor or texture lower, compromising the objectivity of the analytical data.

31. (B) The structural, mechanical, and surface properties of foods detected through the senses of vision, hearing, touch, and kinesthetics.
Food texture is a complex, multi-dimensional sensory quality attribute that reflects the structural, mechanical, and surface properties of a product. It is perceived through several physiological channels, including visual inspection, mechanical touch of fingers, kinesthetic resistance of jaw muscles during mastication, tactile sensations of the oral cavity, and auditory feedback from chewing brittle materials.

32. (A) Both A and R are true and R is the correct explanation of A.
Pungency is not detected by traditional taste buds or olfactory receptors. Instead, chemical compounds like capsaicin stimulate polymodal nociceptors on the trigeminal nerve endings in the mouth and nasal passages. This interaction produces a burning, hot sensation that is classified as a chemesthetic or trigeminal response, rather than a basic taste or a true aroma.

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33. (A) Astringent
The human gustatory system recognizes five scientifically validated basic tastes: sweet, sour, salty, bitter, and umami, each mediated by specialized receptors on the tongue. Astringency is not a basic taste. It is a tactile, chemesthetic sensation caused by tannins or polyphenols binding to and precipitating salivary proteins, leading to friction and dryness in the oral cavity.

34. (C) P-IV, Q-III, R-I, S-II
Taste is perceived when soluble chemical compounds stimulate receptors on the gustatory papillae of the tongue. Aroma involves volatile compounds binding to receptors in the olfactory epithelium. Pungency is a chemesthetic sensation mediated by the trigeminal nerve endings. Color is perceived through photoreceptors in the eye retina. These systems work together to construct food flavor.

35. (A) Orthonasal occurs via the external nares, while retronasal occurs when volatiles reach the olfactory epithelium from the oral cavity.
Orthonasal olfaction occurs when volatile compounds enter the nasal cavity directly through the nostrils during sniffing. Retronasal olfaction occurs during eating, when volatile compounds released from the food matrix during mastication travel from the oral cavity up through

the nasopharynx to reach the olfactory receptors, serving as a primary contributor to overall flavor perception.

36. (D) 1, 2, and 4
Visual appearance is the first quality attribute evaluated by consumers, shaping expectations about quality and taste. Product size, shape, and color are essential components of appearance. Optical properties like gloss or shine are visual attributes reflecting light reflectance, not mechanical textures. Experimental studies confirm that altering a product's color can significantly bias consumer judgment of flavor intensity.

37. (B) It is typically caused by a viral infection damaging the entire olfactory bulb.
Specific anosmia is a highly targeted olfactory deficiency where an individual with an otherwise normal sense of smell cannot perceive a specific volatile compound, often due to genetic variations in olfactory receptor genes. A viral infection that destroys the entire olfactory bulb or epithelium causes general anosmia (complete loss of smell), not specific anosmia.

38. (C) 1, 3, 2, 4
Retronasal aroma perception is initiated when mastication breaks down the food matrix, releasing volatile compounds in the mouth. These gaseous volatiles travel upward through the nasopharynx into the nasal cavity. The volatiles then bind to specific receptors in the olfactory epithelium, sending neural signals to the brain, which integrates these inputs to perceive the final flavor.

39. (D) Visual-flavor interaction (expectation error)
This scenario demonstrates a strong visual-flavor interaction driven by expectation error. Over a lifetime, consumers strongly associate red color in beverages with red-fruit flavors like cherry or strawberry. When presented with a red-colored liquid, the visual system triggers a powerful cognitive expectation that overrides actual gustatory and olfactory inputs, leading the panelist to report tasting cherry.

40. (A) Both Statement I and Statement II are correct.
Flavor is an integrated sensory experience representing the brain's synthesis of multiple chemical and physical inputs, including basic tastes, volatile aromas, and trigeminal sensations. Conversely, taste is a more restricted physiological term that refers specifically to the chemical sensations produced when soluble compounds interact with the taste receptor cells located on the tongue and palate.

41. (B) Adding a sweetening agent like sucrose or high-intensity sweeteners
Bitterness is often a major barrier to consumer acceptance of functional foods containing botanical extracts. In product development, sensory masking is commonly achieved by adding sweeteners such as sucrose. Sweet and bitter tastes exhibit a physiological and cognitive mixture suppression interaction, where the addition of sweetness significantly reduces the perceived intensity of the underlying bitterness.

42. (B) Sour — Quinine sulfate
Standard sensory panel training requires specific, high-purity chemical references to calibrate evaluators. Sucrose represents sweet, sodium chloride represents salty, and monosodium glutamate represents umami. Citric acid or lactic acid is the correct reference compound for sourness. Quinine sulfate is a highly bitter compound used as the standard reference for calibrating the perception of bitterness, not sourness.

43. (A) Deep pressure and jaw muscle movement sensations during mastication.
Kinesthetic texture attributes refer to the mechanical sensations perceived through receptors located in the muscles, tendons, and joints of the jaw and mouth. These receptors detect the physical resistance and deep pressure generated when biting, chewing, and swallowing solid or semi-solid foods, allowing the brain to evaluate structural parameters such as hardness, toughness, and elasticity.

44. (C) Menthol — Cooling sensation
Menthol is a chemical compound that binds to and activates cold-sensitive TRPM8 receptors on trigeminal nerve endings, producing a physiological cooling sensation. Capsaicin and piperine stimulate TRPV1 receptors, producing a burning sensation. Tannins precipitate salivary proteins, leading to astringency, which is a tactile drying sensation rather than a burning or cooling response.

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45. (D) Rheology
Rheology is the scientific study of the deformation and flow of matter under applied forces. It is the fundamental physical science supporting objective food texture and consistency measurements. By quantifying how foods flow, stretch, or break, rheology provides critical physical parameters like viscosity, yield stress, and elasticity that directly correlate with human sensory texture perceptions.

46. (C) An individual with high sensory acuity, extensive formal training, and prolonged experience evaluating a specific product category.
An expert sensory panelist is highly selected and trained to perform analytical evaluations. Unlike naive consumers who express personal hedonic preferences, these individuals have demonstrated superior physiological sensory acuity. Through extensive training and experience with a specific product category, they can objectively identify, describe, and quantify complex sensory attributes with high accuracy and reproducibility.

47. (C) A is true but R is false.
Positive air pressure and activated carbon filters are essential environmental controls designed to eliminate ambient odors that could interfere with sensory evaluations. However, physical air filtration systems have no impact on cognitive, psychological biases like the halo effect or expectation error, which must be mitigated through proper experimental design and sample coding.

48. (D) Hedonic preference assessment test for popular commercial brands
Panelist screening for trained analytical panels focuses entirely on sensory acuity and performance, utilizing objective tests like basic taste identification, detection thresholds, odor recognition, and color vision checks. Assessing personal hedonic preferences for commercial brands is not used for screening trained panelists because analytical panelists must remain completely objective and ignore their personal likes or dislikes.

49. (A) P-III, Q-I, R-II, S-IV
A trained descriptive panel consists of a small, calibrated group profiling attribute intensities. Consumer panels involve a large number of untrained individuals evaluating overall liking and preference. Expert panels consist of highly specialized individuals assessing specific commodities like coffee or wine. Internal quality control panels check daily production against standards to ensure batch-to-batch consistency.

50. (C) All samples in a session must be identical in size, volume, and temperature to prevent bias.
To ensure valid results, all non-test variables of sensory samples must be strictly standardized. Serving samples with differences in size, volume, container type, or temperature introduces external physical cues that can bias the panelist's perception. Standardizing these variables ensures that panelists focus solely on the intrinsic sensory attributes of the food being evaluated.

51. (A) 1, 2, and 4
Objective sensory testing protocols require three-digit random codes to prevent panelists from assuming quality order. Palate cleansers like water remove residues, preventing flavor carryover. Randomizing the presentation order neutralizes positional bias. Testing should not occur after a heavy meal because satiety reduces sensory acuity and interest, while mild hunger optimizes panelist performance and focus.

52. (D) Panelists who demonstrate poor performance during initial screening should be forced to undergo training until they become experts.
Candidate screening is designed to select individuals with naturally high sensory acuity and descriptive potential. Candidates who display poor sensory sensitivity, color blindness, or inability to distinguish basic tastes during screening should be excluded from the panel. Forcing poor performers into training is highly inefficient and rarely produces reliable, high-performing analytical panelists.

53. (B) Cause: Sensory adaptation and fatigue; Effect: Time-order error and reduced sensitivity to subsequent samples.
Sensory adaptation occurs when repeated exposure to a stimulus temporarily reduces receptor sensitivity. In sensory testing, evaluating a strong sample first can saturate taste and olfactory receptors, causing subsequent samples to be perceived as less intense. This time-order error is a direct consequence of sensory fatigue and must be controlled by randomizing sample presentation order.

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54. (C) Provide physical reference standards (e.g., roasted nuts) and allow the panel to align on the terminology.
During descriptive panel training, developing a consensus vocabulary is critical. When panelists struggle to agree on an attribute definition like "nutty," the panel leader must provide physical reference standards, such as specific roasted nuts or chemical solutions. These standards anchor the term, allowing panelists to calibrate their definitions and ensure highly consistent, reproducible data.

55. (C) Statement I is correct but Statement II is incorrect.
Palate cleansers are used in sensory testing to remove residual food and reset the oral environment to a baseline state. However, highly acidic or strongly flavored cleansers are avoided because they cause sensory adaptation or irritation, interfering with subsequent samples. Mild, neutral cleansers like room-temperature water or plain, unsalted crackers are preferred for effective cleansing.

56. (A) Use a balanced block design so each sample appears in every position an equal number of times across the panel.
To prevent positional and order bias, sensory researchers employ a balanced block design. This experimental design ensures that each sample formulation appears in the first, second, and third positions an equal number of times across the sensory panel. This randomization neutralizes systematic time-order errors and ensures that final statistical comparisons are valid.

57. (B) Logical error — Panelist exhibits a reluctance to use the extreme ends of a rating scale, clustering responses near the middle.
A logical error occurs when a panelist associates two separate attributes and rates them similarly because they think they should be related (e.g., assuming a darker yellow butter is creamier). Reluctance to use extreme ends of a rating scale, clustering responses in the middle, is defined as the central tendency error, not a logical error.

58. (B) Mid-morning or mid-afternoon when panelists are neither overly full nor extremely hungry.
The optimal time to conduct analytical sensory testing is mid-morning (around 10:00 AM) or mid-afternoon (around 3:00 PM). At these times, panelists are alert and neither fatigued by a heavy meal nor distracted by extreme hunger. This balanced state maximizes sensory acuity and ensures highly reliable, focused data during descriptive or discrimination tests.

59. (A) Colour masking — Using red lighting in booths to obscure sample color differences
Visual differences can introduce bias during taste and flavor evaluations. To prevent this, sensory booths use color-masking lights, such as red or green illumination, to obscure visual color differences between samples. This physical control forces panelists to evaluate samples based solely on actual taste and aroma, eliminating visual expectation errors.

60. (C) Off-white or light neutral grey
International standards for sensory laboratory design specify that the walls of testing booths must be painted a neutral, matte color, such as off-white or light neutral grey. This prevents visual distraction, reduces glare, and avoids introducing chromatic reflections that could distort the natural appearance and color perception of food samples during evaluation.

61. (D) Analytical methods used to determine whether a perceptible sensory difference exists between two products.
Discrimination testing comprises a class of analytical sensory methods designed to determine whether a perceptible difference exists between two food products. These tests do not measure consumer preference or identify specific flavor notes. Instead, they answer a simple, mathematically modelable question: can human senses detect a difference between a modified product and a control?

62. (A) Both A and R are true and R is the correct explanation of A.
In a standard triangle test, the panelist is presented with three coded samples, where two are identical and one is different. The panelist must identify the odd sample. Because there are three options and only one correct choice, a panelist guessing entirely at random has a one-in-three, or thirty-three point three percent, chance of guessing correctly.

63. (B) Preference ranking test
Discrimination tests are analytical methods used to detect differences between samples. Examples include triangle, duo-trio, and paired comparison

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tests. A preference ranking test is an affective, consumer-oriented method used to measure personal liking and choice. Because it evaluates subjective consumer preference rather than objective sensory differences, it is not classified as a discrimination test.

64. (D) P-II, Q-I, R-I, S-II
In a triangle test, the guessing probability is thirty-three point three percent because there is one odd sample out of three. The duo-trio and two-alternative forced choice paired comparison tests have a fifty percent guessing probability since the panelist chooses between two options. A three-alternative forced choice test has a thirty-three point three percent guessing probability.

65. (A) Panelists receive a reference, then two coded samples, and must identify which matches the reference.
The duo-trio test is a sensory discrimination method. The panelist is first presented with a labeled reference sample, followed by two coded samples, one of which is identical to the reference and the other is different. The panelist is asked to identify which of the two coded samples matches the reference sample.

66. (C) 1 and 2
A directional paired comparison test (2-AFC) is used when a specific sensory attribute is expected to differ between two samples. Panelists are asked a directed question, such as identifying the sweeter sample. It is a highly sensitive test with a fifty percent guessing probability, and can be conducted with untrained consumers since the attribute is specified.

67. (A) It is less efficient than the duo-trio test because the guessing probability is higher in the triangle test.
The triangle test is statistically more efficient than the duo-trio test because its lower guessing probability (one-third versus one-half) requires fewer panelists to achieve the same level of statistical significance. However, it is highly susceptible to sensory fatigue and memory effects because the panelist must evaluate three samples to find the odd one.

68. (D) 2, 1, 4, 3
Conducting a triangle test begins with establishing the hypothesis. Next, the three coded samples are presented to the panelist in a randomized order. The panelist evaluates the samples and identifies the odd sample. Finally, the total number of correct responses is compared against binomial tables to determine if a statistically significant difference exists.

69. (B) Triangle test or Duo-trio test
When a food manufacturer changes an ingredient supplier and wants to confirm that the finished product remains sensory-identical, discrimination tests are the most appropriate choice. Utilizing a triangle test or a duo-trio test allows the company to statistically verify whether consumers can perceive any difference between the original and modified formulations.

70. (C) Statement I is correct but Statement II is incorrect.
The triangle test is statistically more powerful than the duo-trio test because its lower guessing probability reduces the risk of random correct answers. However, a result showing no significant difference does not mathematically prove that the products are identical. It simply indicates that the panel was unable to detect a perceptible difference under the test conditions.

71. (D) Simple Paired Comparison same/different test
Highly pungent and lingering spicy sauces rapidly cause severe sensory fatigue and adaptation. In these situations, complex tests like the triangle test, which require tasting three samples, are highly prone to error. A simple paired comparison same/different test is the most appropriate application, as it only requires tasting two samples, minimizing oral carryover and fatigue.

72. (A) Descriptive analysis — Requires a minimum of 100 completely untrained consumers.
Descriptive analysis is an analytical sensory profiling methodology. It requires a small, highly trained panel of eight to twelve calibrated evaluators, rather than one hundred untrained consumers. Using untrained consumers is characteristic of affective, consumer acceptance testing, as untrained individuals lack the sensory acuity and standardized vocabulary required to generate reliable descriptive profiles.

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73. (B) When samples cannot be presented simultaneously due to strong lingering aftertastes or specific evaluation conditions.
The "A-not-A" test is a discrimination method used when samples cannot be presented simultaneously, such as with products that leave a strong, lingering aftertaste or when evaluating appearance under restricted conditions. Panelists are trained on sample "A," then presented with single samples sequentially, identifying whether each sample is "A" or "not A."

74. (B) Type I Error (Alpha) — Concluding a difference exists when, in reality, no difference exists.
In sensory hypothesis testing, a Type I error occurs when the researcher rejects the null hypothesis and concludes that a perceptible difference exists between samples when, in reality, they are identical. A Type II error occurs when the researcher fails to detect a true difference, concluding the samples are identical when a difference actually exists.

75. (A) Binomial distribution
Discrimination tests like the triangle test generate binary data, where each panelist's response is classified as either correct or incorrect. Because each trial is independent with a constant probability of success, the statistical significance of the results is determined using critical value tables derived directly from the binomial probability distribution.

76. (C) A consensus-based descriptive technique evaluating overall impression, specific flavor notes, intensities, and order of appearance.
The Flavor Profile Method is a pioneering descriptive analysis technique. It utilizes a highly trained panel of experts who work together using a consensus-based approach to define and evaluate a product's sensory attributes. The panel profiles the overall flavor impression, specific flavor notes, their intensities, the order of appearance, and any lingering aftertaste.

77. (A) Both A and R are true and R is the correct explanation of A.
Affective and hedonic sensory tests are designed to measure subjective consumer preference, liking, and market acceptance. To obtain representative data that reflects the actual purchasing behavior of the general population, these tests must be conducted with large groups of untrained consumers who are regular users of the product category, rather than trained experts.

78. (C) Hue
Instrumental Texture Profile Analysis (TPA) is a mechanical double-compression test that measures structural properties such as hardness, springiness, cohesiveness, and chewiness. Hue is an optical color parameter representing the actual color shade in a color space. Because hue is a visual property, it is measured using colorimeters or spectrophotometers, not texture analyzers.

79. (B) P-IV, Q-I, R-III, S-II
Quantitative Descriptive Analysis uses unstructured line scales and statistical analysis like spider plots. The Flavor Profile Method employs a consensus approach to generate profiles without statistical variance. The Texture Profile Method focuses exclusively on rheological characteristics. The Spectrum Method uses extensive calibration to absolute reference standards to provide highly precise, absolute intensity values.

80. (D) Panelists evaluate products in isolated booths on unstructured line scales, and data is analyzed using ANOVA.
Quantitative Descriptive Analysis (QDA) is a formal sensory profiling methodology. Panelists generate a descriptive vocabulary, then evaluate samples individually in isolated booths on unstructured line scales. The panel leader acts strictly as a facilitator and does not participate in testing or influence scores. The resulting quantitative data is statistically analyzed using Analysis of Variance.

81. (A) 1, 2, and 4
Affective sensory testing includes preference testing, where consumers choose between samples, and acceptance testing, which measures the degree of liking on a scale. To account for high human variability, these tests require a large sample of seventy-five to one hundred untrained consumers. Highly trained analytical panelists are never used for hedonic evaluations.

82. (C) Preference testing with a 10-member expert panel accurately reflects broad market success.
Expert panels are trained to be objective analytical instruments and cannot represent the subjective, highly variable preferences of the general public. A small ten-member expert panel cannot predict broad consumer acceptance or market success.

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Reliable preference and acceptance data must be obtained from large, representative samples of untrained consumers from the target demographic.

83. (A) Cause: Lipid oxidation; Effect: Establishing sensory shelf-life based on descriptive data.
Mayonnaise is an oil-in-water emulsion that is highly susceptible to rancidity over time. Auto-oxidation of unsaturated fatty acids produces volatile off-flavors, which are perceived by descriptive panels as a significant increase in the "rancid" attribute score. Tracking these sensory changes allows manufacturers to establish a realistic sensory shelf-life based on consumer rejection thresholds.

84. (D) Spider web plot (Radar chart)
In Quantitative Descriptive Analysis, the mean intensity scores of multiple sensory attributes are typically plotted on a multi-axis radial graph. Each axis represents a specific attribute, and a line connects the points to form a visual pattern. This common graphical representation is called a spider web plot or radar chart, facilitating product profiling comparisons.

85. (A) Both Statement I and Statement II are correct.
In consumer testing, a paired preference test presents a consumer with two coded samples and asks them to choose which sample they prefer. A ranking for preference test is used when three or more samples are presented, requiring the consumer to order the samples based on their individual degree of liking, generating ordinal data.

86. (C) Home Use Test (HUT))
A Home Use Test is the most appropriate format when a product requires specific preparation, multi-step mixing, or extended evaluation over several days in a natural environment. By allowing families to prepare and consume the shake in their own kitchens, the manufacturer obtains highly realistic data regarding preparation convenience, family acceptance, and actual consumption patterns.

87. (D) Amplitude — The specific off-flavor developed during the storage of fatty foods.
In sensory descriptive terminology, a lexicon is a standardized vocabulary, reference standards anchor scales, and order of appearance tracks temporal changes. Amplitude is a term used in the Flavor Profile Method to describe the overall harmony, balance, and integration of a product's flavor profile. It does not refer to off-flavors from lipid rancidity.

88. (A) 9-point Hedonic scale rating
To determine the overall acceptability and degree of liking of a consumer product among the general public, researchers use a nine-point hedonic scale. This affective test allows a large group of untrained consumers to rate their reaction on a balanced scale ranging from "dislike extremely" to "like extremely," providing critical data for market success.

89. (B) Preference ranking — Ordinal data representing ranked order without magnitude of difference
Preference ranking tests require consumers to arrange multiple food samples in order of preference. This methodology generates ordinal data, which indicates the relative position of each sample but does not measure the actual magnitude of difference in liking between them. Other scales generate different data types, such as hedonic scales yielding interval-like data.

90. (B) The overall impression of balance and blending of the individual flavor notes.
In the Flavor Profile Method, amplitude is a specific sensory parameter evaluated by the trained panel. It represents the overall impression of balance, roundness, and blending of the individual flavor notes in a product. A high amplitude rating indicates that the flavor components are well-integrated and harmonious, with no single note overpowering the others.

91. (A) A balanced bipolar scale centered on a neutral category, with four degrees of liking and four of disliking.
The standard nine-point hedonic scale is a balanced, bipolar rating scale used in affective sensory testing. It is centered on a neutral fifth category, "neither like nor dislike." It features four ascending categories representing degrees of liking and four descending categories representing degrees of disliking, allowing consumers to easily communicate their level of acceptance.

92. (A) Both A and R are true and R is the correct explanation of A.
Just-About-Right scales are bipolar diagnostic scales used in consumer testing to evaluate

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attribute intensity. When combined with penalty analysis, researchers can determine the exact impact of deviations from the optimal level. This analysis calculates how much the overall liking score drops when consumers rate an attribute as "too weak" or "too strong," guiding product reformulations.

93. (D) Panelists are restricted to selecting one of exactly five discrete numbers.
A line scale, or visual analogue scale, is a continuous scale typically consisting of a fifteen-centimeter line anchored with descriptive terms at each end. Panelists are free to mark a point anywhere along the line to indicate perceived intensity. They are not restricted to selecting from discrete numbers, allowing for precise, continuous quantitative data.

94. (C) P-II, Q-I, R-III, S-IV
Nominal scales categorize non-ordered data like defect types. Ordinal scales rank samples from most to least preferred without measuring differences. Interval or ratio scales measure exact magnitudes on continuous scales like fifteen-centimeter line scales. Just-About-Right scales evaluate if specific attributes are too low, optimal, or too high, providing crucial guidance for product development.

95. (B) ANOVA evaluates if there are significant differences between the mean sensory scores of three or more samples.
Analysis of Variance is a fundamental parametric statistical technique used in sensory science. It is applied to continuous intensity data to evaluate whether there are statistically significant differences among the mean sensory scores of three or more food samples. ANOVA helps determine if observed variations are due to actual product differences or random error.

96. (D) 1, 2, and 3
Principal Component Analysis is a powerful multivariate statistical technique used to simplify complex sensory descriptive datasets. By reducing dimensionality, PCA creates new, uncorrelated variables that explain the maximum variance. A PCA biplot visually maps the relationships between products and their attributes on a two-dimensional graph, and does not require binary data format.

97. (A) Post-hoc tests (like Tukey's HSD) are run before ANOVA to check if the data is suitable for analysis.
In statistical analysis, Analysis of Variance is conducted first to determine if any significant differences exist among sample means. Post-hoc means separation tests, such as Tukey's Honestly Significant Difference, are only performed after an ANOVA yields a statistically significant product effect. Post-hoc tests are never run before ANOVA to check data suitability.

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98. (C) 2, 3, 4, 1
The logical sequence for analyzing sensory descriptive data begins with collecting intensity ratings from the trained panel. Next, the data is checked to ensure it meets parametric assumptions like normality and homogeneity of variance. ANOVA is then performed to detect any significant product effects, followed by post-hoc tests to identify specific sample differences.

99. (A) Tukey's Honestly Significant Difference (HSD) post-hoc test
When an Analysis of Variance test indicates a statistically significant difference among three or more samples, it does not specify which samples differ. To pinpoint these differences, researchers apply a post-hoc means separation test, such as Tukey's Honestly Significant Difference test, which performs pairwise comparisons while controlling the overall Type I error rate.

100. (A) Both Statement I and Statement II are correct.
In sensory statistics, error control is critical. A Type I error occurs when a researcher concludes that a significant difference exists between food samples when they are actually identical, representing a false positive. A Type II error occurs when the researcher fails to detect a true difference, concluding that the samples are identical, representing a false negative.

101. (B) Cultivars X and Y have similar sensory profiles and are highly rated for crispness.
In a Principal Component Analysis biplot, the distance between product points reflects their overall sensory similarity, while proximity to an attribute vector indicates a high rating for that characteristic. Because Cultivars X and Y are plotted close together near the crispness vector, they possess very similar sensory profiles characterized by high crispness levels.

102. (C) Significance Level (Alpha) — The probability of making a Type II error (false negative).
The significance level, or alpha, represents the probability of committing a Type I error, which is falsely concluding a significant difference exists. The probability of making a Type II error is denoted by beta, while one minus beta represents statistical power. Other definitions, such as the null hypothesis, p-value, and variance, are standard and correct.

103. (D) 15-cm unstructured line scale with anchors
For highly trained descriptive panels, such as those conducting Quantitative Descriptive Analysis, the most appropriate rating scale is a fifteen-centimeter unstructured line scale with verbal anchors. This continuous scale allows trained panelists to precisely record perceived intensity without the constraints of discrete numbers, generating high-resolution, parametric data suitable for advanced statistical analysis.

104. (A) Randomized Complete Block Design (RCBD) — Every panelist evaluates all samples in a randomized order.
In sensory evaluation, a Randomized Complete Block Design is a standard experimental setup where each panelist acts as a "block" and evaluates all sample formulations being tested. Within each block, the samples are presented in a randomized order to neutralize positional bias, ensuring that systematic order effects do not compromise the statistical results.

105. (B) David Peryam and Norman Girardot
The nine-point hedonic scale was developed in the late 1940s by food researchers David Peryam and Norman Girardot. Working at the United States Armed Forces Quartermaster Food and Container Institute, they designed this balanced bipolar scale to systematically measure food preferences and predict consumption rates among military personnel, establishing a foundational sensory tool.

106. (B) A double compression mechanical test designed to simulate chewing and extract multiple texture parameters.
Instrumental Texture Profile Analysis is a mechanical compression test performed on a texture analyzer. It subjects a food sample to two sequential compression cycles, closely simulating the action of the human jaw during chewing. From the resulting force-time curve, researchers calculate multiple mechanical parameters, including hardness, cohesiveness, springiness, and chewiness, for objective profiling.

107. (A) Both A and R are true and R is the correct explanation of A.
The CIE Lab color space is a three-dimensional mathematical model widely used to objectively measure food color. It was designed to be device-independent and perceptually uniform, meaning that a specific numerical change in color coordinates corresponds directly to a similar change in color as perceived by the average human eye, ensuring highly consistent measurements.

108. (C) Viscosity
Instrumental Texture Profile Analysis is designed for solid or semi-solid foods, extracting parameters such as hardness, springiness, cohesiveness, and chewiness from a double compression force-time curve. Viscosity is a rheological property of liquid foods representing resistance to flow, and is measured using rotational viscometers or consistometers, not standard solid compression TPA.

109. (D) P-II, Q-I, R-IV, S-III
Hardness is the peak force during the first compression. Cohesiveness is calculated as the ratio of the positive force area during the second compression to that of the first. Springiness represents the height the sample recovers between compressions. Chewiness is mathematically derived as the product of hardness, cohesiveness, and springiness, describing solid food texture.

110. (C) L* represents lightness (0=black, 100=white); a* represents red/green; b* represents yellow/blue.
In the CIE Lab color space, color is defined by three coordinates. L* measures lightness, ranging from zero for black to one hundred for white. The a* coordinate indicates the red-to-green axis, where positive values are red and negative are green. The b* coordinate represents the yellow-to-blue axis, where positive values are yellow and negative are blue.

111. (B) 1, 2, and 4
Shear force measurements, such as those obtained using the Warner-Bratzler shear device, are standard objective methods for evaluating meat tenderness. The test measures the peak force required to shear a meat core perpendicular to

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the muscle fibers. A higher shear force value indicates a tougher meat sample, whereas a lower value indicates superior tenderness.

112. (D) Ketchup is a dilatant (shear-thickening) fluid, meaning its viscosity increases rapidly when stirred or shaken.
Ketchup is not a dilatant fluid. Instead, it is a pseudoplastic, or shear-thinning, non-Newtonian fluid that also exhibits thixotropic behavior. This means that when shear stress is applied, such as by stirring, shaking, or squeezing the bottle, its apparent viscosity decreases rapidly, allowing the product to flow easily, rather than increasing in viscosity.

113. (A) Metamerism
Metamerism is an optical phenomenon where two color samples appear to match perfectly under a specific light source but show a distinct mismatch when viewed under a different illuminant. This occurs because the samples have different spectral reflectance curves but produce identical tristimulus values under the first light source, causing commercial color matching issues.

114. (C) Perform a Pearson correlation or PLS regression between instrumental hardness and the descriptive panel's firmness scores.
To validate instrumental texture measurements, researchers correlate the objective mechanical data with subjective ratings from a trained descriptive panel. Applying statistical techniques like Pearson correlation or Partial Least Squares regression between instrumental peak force and panel firmness scores establishes a robust, mathematically validated link between machine measurements and human physical perception.

115. (A) Both Statement I and Statement II are correct.
Colorimeters and spectrophotometers are distinct optical instruments. Tristimulus colorimeters use red, green, and blue filters to mimic human eye color matching, making them ideal for routine quality control. Spectrophotometers measure spectral reflectance across narrow wavelength intervals, providing highly precise spectral data that is essential for research, formulation matching, and identifying subtle color deviations.

116. (D) The consistency based on the flow distance under its own weight in a given time.
The Bostwick consistometer is a simple, empirical instrument widely used in quality control. It does not measure absolute viscosity in centipoise or yield stress. Instead, it determines consistency by measuring the distance a semi-solid food product, like tomato ketchup, flows along a graduated metal trough under its own weight within a specified time limit.

117. (B) Warner-Bratzler shear blade — Measuring the spreadability of butter and margarine.
The Warner-Bratzler shear blade is designed to measure the tenderness and toughness of meat by shearing muscle fibers. It is not used to measure the spreadability of butter and margarine. Spreadability is typically measured using specialized extrusion cells, cone penetrometers, or texture analyzer spreadability fixtures designed to quantify compression and shear resistance.

118. (C) A uniaxial compression test using a standard cylinder probe
To evaluate the texture of baked bread crumb, specifically its firmness or staleness, a uniaxial compression test is the standard method. Using a texture analyzer equipped with a flat-faced cylinder probe, the bread slice is compressed to a specified depth, measuring the resistance force. This force correlates directly with human perception of bread freshness.

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119. (D) Capillary viscometer — Measures the flow time of a fluid through a narrow tube under gravity.
A capillary viscometer operates by measuring the time required for a specified volume of fluid to flow under gravity through a calibrated, narrow glass capillary tube. This flow time is directly proportional to the kinematic viscosity of the fluid, making it highly accurate for thin, Newtonian liquids like water or clear fruit juices.

120. (A) CIE Lab uses cube roots for perceptual uniformity, while Hunter Lab uses square roots.
The primary mathematical difference between Hunter Lab and CIE Lab color spaces lies in their coordinate scaling equations. CIE Lab utilizes cube-root transformations of tristimulus values to achieve superior perceptual uniformity across a wide range of colors. In contrast, the older Hunter Lab system utilizes square-root transformations,

resulting in slight differences in color difference calculations.

121. (B) A proactive, process-oriented system focused on defect prevention through planning, documentation, and process design.
Quality Assurance is a proactive, process-oriented management system designed to build quality into food products. It focuses on preventing defects before they occur by establishing robust process designs, standard operating procedures, employee training, and extensive documentation, rather than relying on reactive inspection and sorting of finished products on the packaging line.

122. (A) Both A and R are true and R is the correct explanation of A.
Quality Assurance and Quality Control are complementary but distinct functions. Quality Assurance is proactive, focusing on establishing standardized processes, documentation, and preventive actions to avoid defects. Quality Control is a reactive, product-oriented function that inspects, tests, and verifies the finished product to identify and segregate any defective units before they leave the facility.

123. (A) Principal Component Analysis
The Seven Basic Quality Control Tools are simple, visual statistical methods used for troubleshooting and process improvement. They include Pareto charts, cause-and-effect diagrams, control charts, scatter diagrams, histograms, check sheets, and stratification. Principal Component Analysis is an advanced, multivariate statistical modeling technique requiring specialized software, and is not classified as a basic tool.

124. (C) P-IV, Q-I, R-II, S-III
A Pareto chart prioritizes quality issues using the eighty-twenty rule. An Ishikawa diagram systematically maps the potential root causes of a specific problem. A control chart monitors process variation over time to detect out-of-control conditions. A scatter diagram identifies the correlation between two variables. These tools support structured industrial quality control and process improvement.

125. (D) SOPs provide step-by-step written instructions to help workers consistently carry out routine operations.
Standard Operating Procedures are essential documents within a Quality Assurance system. They provide clear, step-by-step written instructions for executing routine manufacturing operations. By standardizing tasks such as equipment cleaning, raw material handling, or packaging, SOPs minimize human error and process variation, ensuring consistent product quality, safety, and compliance with industrial standards.

126. (C) 1, 2, and 3
Quality audits are structured evaluations of quality management systems. First-party audits are internal self-assessments, second-party audits evaluate suppliers, and third-party audits are conducted by independent certification bodies to verify compliance with standards like ISO 22000. Audits are designed to identify system weaknesses and drive continuous improvement, never to blame or punish individual employees.

127. (B) A process is in control if 7 consecutive points continuously increase within control limits.
In statistical process control, control charts identify non-random patterns. A process is considered out of control if any point falls outside the control limits, or if specific run rules are violated. Having seven consecutive points continuously increasing or decreasing indicates a systematic trend, signaling an out-of-control condition that requires immediate investigation, not a stable process.

128. (D) 1, 4, 2, 3
Constructing a cause-and-effect diagram begins with defining the specific quality problem at the head of the diagram. Next, the major categories of potential causes, such as the five Ms, are established as main branches. Brainstormed detailed causes are then attached as sub-branches, and the completed diagram is analyzed to identify the root cause.

129. (A) Focus investigative resources on the "underweight" defect, as it constitutes the vital few causes of rejections.
The Pareto principle states that eighty percent of process defects arise from twenty percent of the causes. In this scenario, underweight loaves constitute seventy percent of all rejections. Applying this principle, management must prioritize and focus its analytical and corrective resources on solving the underweight defect, as addressing this "vital few" issue yields the greatest improvement.

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130. (C) Statement I is correct but Statement II is incorrect.
Quality Assurance systems rely on robust, comprehensive documentation to provide objective evidence of regulatory compliance and process control. Similarly, Quality Control functions require documented records of all analytical test results, inspections, and calibration data. Relying on verbal communication without written records violates food safety regulations and standard manufacturing quality principles.

131. (A) A change request is approved, the document is updated with a new revision, and obsolete copies are removed.
Under a formal quality document control system, updating a Standard Operating Procedure requires a structured, approved change request process. The document is revised, reviewed, assigned a new version number, and authorized. Obsolete copies must be promptly collected and destroyed or archived to prevent workers from using outdated and potentially unsafe instructions.

132. (D) Preventive action — Action taken merely to fix or rework a defective product that has already been produced.
Fixing or reworking a defective product is defined as correction or correction action, which addresses an existing issue. Preventive action is a proactive measure taken to identify potential non-conformances before they occur, implementing controls to prevent their initial occurrence. Confusing preventive action with product rework represents a fundamental misunderstanding of quality management terminology.

133. (B) It reduces costs associated with scrap, rework, and product recalls by building quality into the process.
Implementing a proactive Quality Assurance system focuses on preventing defects through design and process control. By preventing errors before they occur, companies significantly reduce costs associated with product waste, rework, customer complaints, and recalls. This approach is highly efficient, saving resources compared to relying on end-product testing to reject defective batches.

134. (C) Cause-and-Effect diagram — Ishikawa or Fishbone diagram
The cause-and-effect diagram is one of the seven basic quality control tools. It was developed by Kaoru Ishikawa to map out potential causes of a quality issue, and is commonly referred to as the Ishikawa diagram or, due to its physical appearance, the fishbone diagram. Other pairings of quality tools are incorrect.

135. (D) Deming Cycle (PDCA))
The continuous quality improvement framework consisting of four sequential phases—Plan, Do, Check, and Act—is known as the Deming Cycle or PDCA cycle. Introduced by Walter Shewhart and popularized by W. Edwards Deming, this systematic loop guides organizations in testing improvements, analyzing results, and standardizing successful changes for sustained quality management.

136. (A) The application of statistical techniques to monitor and control a process to ensure conforming products.
Statistical Process Control is an industry-standard methodology that applies statistical techniques to monitor and control manufacturing processes. By plotting operational variables on control charts, SPC helps distinguish between natural common cause variation and erratic special cause variation, allowing operators to make real-time adjustments and maintain process capability, preventing the production of defective goods.

137. (A) Both A and R are true and R is the correct explanation of A.
In the Cost of Quality model, investing in prevention costs, such as operator training and robust process design, reduces total quality costs over time. This proactive investment prevents defects from occurring, leading to a dramatic reduction in internal failure costs like scrap and rework, as well as expensive external failure costs like recalls and litigation.

138. (B) Processing consumer product returns and issuing refunds
Internal failure costs are expenses incurred when a quality defect is detected before the product is shipped to consumers, such as reworking dough or scrapping misprinted packaging. Processing consumer returns, managing complaints, and issuing refunds occur after the product has been distributed, and are therefore classified as external failure costs, which are typically much higher.

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139. (A) P-III, Q-I, R-IV, S-II
Prevention costs include proactive training on standard procedures. Appraisal costs involve routine raw material testing to assess quality. Internal failure costs occur when off-specification products are identified before shipment, such as downgrading food to animal feed. External failure costs arise after delivery, including product recall logistics and legal settlements.

140. (C) Each complaint should trigger a root cause investigation followed by corrective action to prevent recurrence.
Consumer complaints represent critical feedback regarding external quality failures. Best practices require that every complaint be documented, categorized, and investigated to identify its root cause. The quality department must then implement effective corrective actions to prevent recurrence, ensuring continuous process improvement and maintaining consumer trust in the brand.

141. (D) 1, 3, and 4
Effective supplier quality management requires clear, documented raw material specifications to establish acceptable quality baselines. Conducting supplier audits verifies their processing capabilities, and tracking performance metrics ensures long-term consistency. Relying blindly on a certificate of analysis from an unapproved supplier without internal verification is a risky practice that violates safety standards.

142. (C) End-product testing efficiently catches every single defective unit in a run via random sampling.
Random sampling and end-product testing are statistically incapable of catching every single defective unit in a production run, especially when defect rates are low. Relying solely on final testing is inefficient and costly. In contrast, modern quality assurance systems focus on in-process monitoring to control variables and prevent defects from being manufactured.

143. (B) Cause: Assured supplier capability; Effect: Reduced frequency of incoming raw material testing via skip-lot sampling.
Implementing a rigorous supplier approval program, including onsite audits and strict raw material specifications, assures the supplier's capability to consistently deliver quality materials. This high level of trust allows the buying manufacturer to implement skip-lot sampling, reducing the frequency and cost of incoming raw material testing without compromising safety or quality standards.

144. (D) External failure costs
Under the Cost of Quality framework, expenses incurred after a defective or non-conforming product has been shipped to the customer are classified as external failure costs. Because the yogurt reached the market with undeclared allergens, the resulting nationwide recall, product destruction, shipping logistics, and potential legal fines represent classic external failure costs.

145. (A) Both Statement I and Statement II are correct.
Corrective action and preventive action are distinct, fundamental concepts in quality assurance systems. Corrective action is a reactive measure taken to identify and eliminate the root cause of an existing, detected non-conformity to prevent its recurrence. Preventive action is a proactive measure taken to identify potential non-conformities before they occur and prevent their initial occurrence.

146. (C) Management Review meeting
The Management Review meeting is a structured process required by quality standards like ISO 9001 and ISO 22000. It is designed specifically to present high-level quality data—such as audit results, customer complaints, and process performance—to top management. This ensures active leadership engagement and facilitates strategic resource allocation for continuous quality improvement.

147. (A) $Cp < 1.0$ — Indicates the process variation is significantly tighter than the specification limits, guaranteeing zero defects.
A process capability index (Cp) of less than one point zero indicates that the natural process variation is wider than the specification limits. This means the process is incapable of consistently producing conforming products, leading to defects even if centered. A capable process requires a Cp value of at least one point three three.

148. (D) Test a pre-shipment sample, audit the supplier, and sign a specification agreement prior to purchase.
Before purchasing a critical functional ingredient from a new supplier, a food manufacturer must follow a proactive supplier approval process.

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This involves testing a pre-shipment sample to verify functionality, auditing the supplier's facility to ensure food safety compliance, and signing a mutually agreed raw material specification document to establish a clear quality baseline.

149. (B) Special cause variation — Signals the process is out of control and requires immediate investigation.
In statistical process control, special cause variation represents non-random, unpredictable disturbances in a process, such as equipment malfunction or operator error. This type of variation signals that the process is out of control, requiring immediate investigation and corrective action. Common cause variation is inherent to the process design and is stable over time.

150. (C) Traceability
Traceability is legally defined as the ability to trace and follow a food, feed, food-producing animal, or substance intended for consumption through all stages of production, processing, and distribution. A robust traceability system utilizes batch coding and detailed documentation, allowing manufacturers to quickly identify, locate, and isolate non-conforming products during food safety recalls.

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CHAPTER 24

Detection of Adulterants, Toxins, Radiation and Radioactivity in Food

1. Which of the following best describes the concept of food adulteration?
(A) The natural degradation of food quality due to prolonged storage under high temperature and humidity.
(B) The intentional addition of inferior substances or extraction of nutrients, making food unsafe.
(C) The accidental contamination of food through naturally occurring environmental toxins during harvest.
(D) The authorized addition of micronutrients to food products during commercial processing steps.

2. Which of the following is the correct statement regarding the types of food adulteration?
(A) Incidental adulteration involves the deliberate addition of coloring agents to conceal food spoilage.
(B) Intentional adulteration occurs strictly due to ignorance or negligence during post-harvest handling.
(C) Metallic contamination from processing equipment is classified as incidental adulteration.
(D) Adulteration is defined exclusively by the presence of microbial pathogens, regardless of chemical additives.

3. Consider the following statements regarding common adulterants in milk:
1. Urea is added to artificially elevate the solid-not-fat (SNF) content and provide whiteness.
2. Starch is incorporated to decrease the viscosity of milk diluted with water.
3. Detergents are used to emulsify added oils and mimic the natural frothing of milk.
4. Added water increases the specific gravity and lactometer reading of milk.

Which of the statements given above are correct?
(A) 1 and 2
(B) 2 and 4
(C) 3 and 4
(D) 1 and 3

4. What is the precise definition of an "adulterant" in the context of food safety?
(A) Any material which is or could be employed for making the food unsafe, sub-standard, or misbranded.
(B) Any substance used to naturally enhance the flavor and shelf-life of food without altering its composition.
(C) A chemical or biological agent exclusively produced by microbial fermentation in dairy products.
(D) A regulatory approved food additive used within permissible limits to maintain physical stability.

5. Consider the following statements of Assertion (A) and Reason (R):
Assertion (A): The addition of water to whole milk lowers its Solid-Not-Fat (SNF) percentage.
Reason (R): Water acts as a diluent, effectively reducing the concentration of dissolved proteins, lactose, and minerals per unit volume.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

6. Which of the following statements is incorrect concerning the detection of starch in milk?
(A) Starch is primarily added to milk to offset the drop in specific gravity caused by water dilution.
(B) A positive test for starch in milk yields a distinct brick-red precipitate upon heating.
(C) The presence of starch in milk is detected using a 1% iodine solution.
(D) The formation of a blue-black complex is due to the interaction of iodine with amylose

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in starch.

7. Match the milk adulterants in List I with their specific reagents/tests in List II:
List I: (Milk Adulterant)
P. Urea
Q. Cane Sugar
R. Starch
S. Added Water
List II: (Specific Reagent/Test)
I. Resorcinol in hydrochloric acid
II. Lactometer specific gravity test
III. p-Dimethylaminobenzaldehyde (DMAB)
IV. Iodine solution
(A) P-III, Q-I, R-IV, S-II
(B) P-I, Q-III, R-II, S-IV
(C) P-IV, Q-II, R-I, S-III
(D) P-III, Q-IV, R-I, S-II

8. When analyzing a milk sample suspected of being adulterated with urea using p-Dimethylaminobenzaldehyde (DMAB) reagent, a distinct yellow color develops. What is the fundamental principle behind this reaction?
(A) Urea reacts directly with iodine solution to yield a stable, yellow-colored halogenated complex.
(B) Urea acts as a strong oxidizing agent, rapidly changing the color of methylene blue to yellow.
(C) Urea reacts with acidic DMAB reagent to produce a characteristic yellow-colored complex.
(D) Urea undergoes rapid enzymatic breakdown to release free ammonia, turning phenol red to yellow.

9. Which of the following represents the correct sequence of steps for detecting detergent in a milk sample using the methylene blue extraction method?
1. Add an equal volume of chloroform to the test tube.
2. Pipette the milk sample into a test tube.
3. Observe the intense blue color in the lower chloroform layer for a positive result.
4. Add methylene blue dye solution and mix thoroughly.
(A) 2, 4, 1, 3
(B) 2, 1, 4, 3
(C) 4, 2, 1, 3
(D) 1, 2, 3, 4

10. Which of the following is NOT a plausible chemical reason for intentionally adulterating milk with synthetic detergents?
(A) To emulsify externally added vegetable fats.
(B) To artificially increase the natural frothing and foam stability of the milk.
(C) To enhance the natural microbial fermentation process for yogurt production.
(D) To give a misleading appearance of thickness and creaminess to diluted milk.

11. Consider the following statements regarding the calculation of Solids-Not-Fat (SNF) in milk:
Statement I: The SNF can be estimated using the Richmond's formula: $SNF = \frac{CLR}{4} + 0.2F + 0.14$.
Statement II: In this formula, CLR stands for Corrected Lactometer Reading and F represents the fat percentage.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

12. A batch of milk is found to have a normal fat content but an unusually thick consistency. Upon heating and adding iodine, a deep blue color appears. Which of the following conclusions is most accurate?
(A) The milk has been naturally fermented by lactic acid bacteria producing exopolysaccharides.
(B) The milk has been fortified with excessive whey protein isolate.
(C) The milk is adulterated with urea, causing protein denaturation and thickening.
(D) The milk has been adulterated with a thickening carbohydrate, specifically starch.

13. To determine the exact total solids content in milk, which of the following analytical methods is considered the most reliable?
(A) Gravimetric analysis by evaporating the sample to dryness in a standard hot air oven.
(B) Hydrometry using a high-precision calibrated lactometer at a controlled room temperature.
(C) Refractometry utilizing the light-bending refractive index of the clarified milk serum.
(D) Colorimetric titration using standard sodium hydroxide and phenolphthalein indicator.

14. Which of the following is the correct pair of adulterant and its corresponding detection reagent in milk?

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(A) Formaldehyde – Rosolic acid chemical indicator
(B) Neutralizers – Concentrated Hehner's reagent
(C) Hydrogen peroxide – Paraphenylenediamine
(D) Gelatin – Resorcinol in hydrochloric acid

15. What is the primary cause-and-effect relationship of adding neutralizers (like sodium carbonate) to milk?
(A) Cause: Neutralizer addition; Effect: Masks high acidity to prevent heat coagulation.
(B) Cause: Neutralizer addition; Effect: Promotes rapid butterfat separation during churning.
(C) Cause: Neutralizer addition; Effect: Decreases the density to mimic pure whole milk samples.
(D) Cause: Neutralizer addition; Effect: Triggers the rapid growth of beneficial probiotic bacteria.

16. Which specific chemical test is employed for the detection of argemone oil in edible mustard oil?
(A) Halphen test
(B) Hexabromide test
(C) Baudouin test
(D) Nitric acid test

17. Which of the following is the correct statement regarding the adulteration of edible oils?
(A) The addition of animal lard to vegetable oils significantly elevates polyunsaturated fatty acid levels.
(B) Vegetable ghee adulterated with animal fats is detected using the phytosterol acetate test.
(C) Argemone oil represents a legitimate, regulatory-approved alternative to pure mustard seed oil.
(D) Petroleum-derived mineral oil is added to edible oils to artificially boost saponification value.

18. Consider the following statements regarding the detection of oil adulterants:
1. The Baudouin test detects the presence of sesame oil in ghee or butter.
2. Mineral oil adulteration can be detected by examining the unsaponifiable matter.
3. Argemone oil adulteration is completely harmless and only affects the taste of mustard oil.
4. The Halphen test is specifically used to detect cottonseed oil.

Which of the statements given above are correct?
(A) 1, 2, and 3
(B) 2, 3, and 4
(C) 1, 2, and 4
(D) 1, 3, and 4

19. In the context of food adulteration, how is "mineral oil" defined?
(A) A marine oil derived from deep-sea fish, rich in essential minerals.
(B) A synthetic edible oil fortified with trace minerals like zinc and iron.
(C) An oil extracted from mineral-rich soils, used in organic farming.
(D) A non-edible petroleum hydrocarbon that cannot be saponified by alkali.

20. Consider the following statements of Assertion (A) and Reason (R):
Assertion (A): The Baudouin test is mandated for vanaspati (hydrogenated vegetable oil) in many jurisdictions.
Reason (R): The mandatory addition of a small percentage of sesame oil to vanaspati ensures its easy detection if vanaspati is used to adulterate pure ghee.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

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21. Which of the following statements is incorrect regarding the phytosterol test?
(A) It differentiates between animal fats and vegetable oils.
(B) The test involves the isolation of sterols from the saponifiable fraction of the oil.
(C) Cholesterol is primarily found in animal fats, whereas phytosterols are present in vegetable oils.
(D) Analyzing the melting point of sterol acetates helps confirm the type of fat.

22. Match the edible oil/fat adulteration tests in List I with the adulterants detected in List II:
List I: (Edible Oil/Fat Adulteration Test)
P. Baudouin test
Q. Nitric acid test
R. Halphen test

S. Holde's test

List II: (Adulterant Detected)

I. Argemone oil

II. Sesame oil (in vanaspati/ghee)

III. Mineral oil

IV. Cottonseed oil

(A) P-I, Q-II, R-III, S-IV

(B) P-II, Q-I, R-IV, S-III

(C) P-IV, Q-III, R-II, S-I

(D) P-II, Q-IV, R-I, S-III

23. When furfural and hydrochloric acid are added to a melted ghee sample, a permanent crimson-red color develops in the acid layer. What does this indicate?

(A) The ghee is adulterated with vanaspati containing sesame oil.

(B) The ghee is pure and has a high concentration of natural antioxidants.

(C) The ghee is adulterated with mineral oil.

(D) The ghee contains excessive added synthetic colors.

24. Which of the following represents the correct sequence of steps for performing the phytosterol test?

1. Extract the unsaponifiable matter using a suitable solvent (e.g., diethyl ether).
2. Saponify the fat sample with alcoholic potassium hydroxide.
3. Determine the melting point of the crystallized acetates.
4. Convert the isolated sterols into their acetate derivatives.

(A) 2, 1, 4, 3

(B) 1, 2, 3, 4

(C) 2, 4, 1, 3

(D) 4, 2, 1, 3

25. Which of the following analytical parameters is NOT used to detect mineral oil adulteration in edible oils?

(A) Saponification value

(B) Unsaponifiable matter percentage

(C) Holde's test (alkaline turbidity)

(D) Iodine value

26. Consider the following statements regarding argemone oil adulteration:

Statement I: Argemone oil contains toxic alkaloids such as sanguinarine and dihydrosanguinarine.

Statement II: Consumption of argemone oil adulterated mustard oil can lead to Epidemic Dropsy.

(A) Both Statement I and Statement II are true.

(B) Both Statement I and Statement II are false.

(C) Statement I is true but Statement II is false.

(D) Statement I is false but Statement II is true.

27. Which of the following analytical approaches can definitively prove the presence of animal depot fat (lard) in pure cow ghee?

(A) Conducting a highly sensitive iodine test to verify the presence of unbranched storage polysaccharides.

(B) Performing gas chromatography of sterols to detect altered cholesterol-to-phytosterol ratios.

(C) Analyzing the refractive index exclusively under multiple temperature-controlled laboratory settings.

(D) Utilizing the Baudouin test to detect specific, immunologically active bovine animal proteins.

28. To reliably quantify the exact percentage of various vegetable oils in a blended adulterated oil sample, which of the following analytical techniques is most appropriate?

(A) Thin layer chromatography of polar lipid compounds.

(B) UV-Visible spectrophotometry of unsaponifiable matter.

(C) Atomic absorption spectroscopy of metallic trace minerals.

(D) Gas chromatography profiling of fatty acid methyl esters.

29. Which of the following is the correct pair of edible oil adulterant and its associated health consequence?

(A) Argemone oil – Epidemic Dropsy

(B) Mineral oil – Lathyrism

(C) Tricresyl phosphate – Scurvy

(D) Castor oil – Botulism

30. What is the cause-and-effect relationship associated with tricresyl phosphate (TCP) adulteration in edible oils?

(A) Cause: Ingestion of TCP; Effect: Spikes in blood glucose levels causing severe ketoacidosis.

(B) Cause: Ingestion of TCP; Effect: Blocked absorption of dietary vitamin D causing severe rickets.

(C) Cause: Ingestion of TCP; Effect:

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Cholinesterase inhibition leading to polyneuropathy.
(D) Cause: Ingestion of TCP; Effect: Accelerated destruction of erythrocytes causing hemolytic anemia.

31. Which chemical reagent is commonly used for the rapid spot detection of metanil yellow adulteration in turmeric powder?
(A) Concentrated hydrochloric acid
(B) Concentrated sulfuric acid
(C) Diluted sodium hydroxide solution
(D) Acidified potassium permanganate

32. Which of the following is the correct statement regarding the common adulteration of chilli powder?
(A) Chicory root powder is commonly added to processed chilli powder to enhance its pungent flavor.
(B) Toxic lead chromate is specifically added to chili powder shipments to impart a bright green color.
(C) Exhausted chilli waste is easily detected in labs by measuring its abnormally high capsaicin content.
(D) Brick powder and Sudan dyes are used to increase bulk and impart a bright red color.

33. Consider the following statements concerning spice adulteration:
1. Papaya seeds are often used to adulterate black pepper because of their physical resemblance.
2. Coriander powder is commonly adulterated with horse dung or sawdust.
3. Turmeric powder adulteration with lead chromate poses a risk of lead poisoning.
4. Cinnamon bark is rarely adulterated with cassia bark due to strict morphological differences.

Which of the statements given above are correct?
(A) 1, 2, and 4
(B) 1, 2, and 3
(C) 1, 3, and 4
(D) 2, 3, and 4

34. How is "exhausted tea" best defined in the context of food adulteration?
(A) Tea leaves that are grown under strict organic conditions without any synthetic chemical fertilizers.
(B) Tea leaves subjected to prolonged, controlled microbial fermentation to artificially darken their color.
(C) Tea leaves from which active soluble components like caffeine and tannins have been extracted.
(D) Tea leaves that have significantly exceeded their legally declared shelf life but remain unadulterated.

35. Consider the following statements of Assertion (A) and Reason (R):
Assertion (A): Chicory root powder is considered an adulterant in pure coffee unless explicitly declared as a coffee-chicory blend.
Reason (R): Chicory powder lacks caffeine and is a cheaper substitute that mimics the roasted appearance and bitter profile of coffee.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

36. Which of the following statements is incorrect regarding the adulteration of honey?
(A) Pure honey has a natural tendency to crystallize, which indicates it is heavily adulterated with table sugar.
(B) Honey is frequently adulterated with High Fructose Corn Syrup (HFCS) due to similar sugar profiles.
(C) Invert sugar added to honey can often be detected by checking for elevated levels of Hydroxymethylfurfural (HMF).
(D) Stable Carbon Isotope Ratio Analysis (SCIRA) is the gold standard for detecting C4 plant sugars in honey.

37. Match the spices/condiments in List I with their common adulterants in List II:
List I: (Spice/Condiment)
P. Black pepper
Q. Turmeric powder
R. Chilli powder
S. Coriander powder
List II: (Common Adulterant)
I. Lead chromate
II. Sawdust / Dung powder
III. Papaya seeds
IV. Sudan Red dye
(A) P-I, Q-III, R-II, S-IV
(B) P-III, Q-I, R-IV, S-II

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(C) P-IV, Q-II, R-I, S-III
(D) P-III, Q-IV, R-I, S-II

38. When a few drops of iodine solution are added to a sample of powdered turmeric, a distinct blue-black color is observed. What does this indicate?
(A) The turmeric sample is completely pure and possesses high concentrations of active curcuminoids.
(B) The turmeric is adulterated with a starch-based filler like wheat or rice flour.
(C) The turmeric sample is contaminated with unpermitted synthetic dyes like metanil yellow.
(D) The turmeric naturally contains exceptionally high levels of volatile essential oils.

39. Which of the following represents the correct sequence of steps for detecting C4 sugar adulteration in honey using Elemental Analyzer - Isotope Ratio Mass Spectrometry (EA-IRMS)?
1. Isotope ratio mass spectrometry measurement of the resulting gases.
2. Complete combustion of the honey sample into CO_2.
3. Calculation of the $^{13}C/^{12}C$ ratio against an international standard.
4. Preparation and weighing of the honey sample and protein extract.

(A) 4, 2, 1, 3
(B) 2, 4, 1, 3
(C) 1, 2, 4, 3
(D) 4, 1, 2, 3

40. Which of the following is NOT typically used as an adulterant in coriander powder?
(A) Sawdust
(B) Ground horse dung
(C) Argemone seeds
(D) Powdered bran

41. Consider the following statements regarding honey adulteration:
Statement I: C4 plant sugars (like corn and cane) have a different $^{13}C/^{12}C$ isotopic signature compared to the nectar of C3 plants primarily collected by bees.
Statement II: The addition of C4 sugars to honey shifts its $\delta^{13}C$ value to be more negative, mimicking pure C3 honey perfectly.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

42. When a sample of tea leaves instantly releases a bright red-brown color upon being dropped into cold water, without any heating or stirring, what is the most likely form of adulteration?
(A) The tea leaves are heavily adulterated with iron filings.
(B) The tea leaves were subjected to excessive natural oxidation during processing.
(C) The tea leaves have been coated with a water-soluble synthetic dye.
(D) The tea leaves contain high levels of naturally occurring catechins.

43. Which simple physical test effectively differentiates pure coffee powder from chicory powder?
(A) Spreading the mixed sample over a strong magnet to easily separate and attract magnetic chicory particles.
(B) Sprinkling the powder on cold water; coffee floats whereas chicory quickly sinks, leaving a distinct brown trail.
(C) Dissolving the powder in absolute ethanol to separate the insoluble coffee from soluble chicory fraction.
(D) Dry heating the powder in a porcelain crucible to observe whether the chicory produces a distinct blue flame.

44. Which of the following is the correct pair of food product and its characteristic chemical detection test for adulteration?
(A) Tea – Halphen test for exhausted leaves
(B) Coffee – Baudouin test for chicory
(C) Black pepper – Nitric acid test for papaya seeds
(D) Honey – Fiehe's test for invert sugar

45. What is the cause-and-effect relationship regarding the physical extraction of iron filings from adulterated tea?
(A) Cause: Using a strong magnet; Effect: Metallic iron filings are attracted and separated from the tea.
(B) Cause: Adding organic solvents; Effect: Iron filings dissolve rapidly to turn the solution green.
(C) Cause: Adding hydrochloric acid; Effect: Dissolved iron instantly precipitates as white crystals.

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(D) Cause: Boiling the tea leaves; Effect: Heavy iron filings easily evaporate along with hot steam.

46. Which naturally occurring fungal toxin is notoriously found in improperly stored rye and other cereals, historically causing St. Anthony's Fire?
(A) Aflatoxin
(B) Patulin
(C) Ergot alkaloid
(D) Ochratoxin A

47. Which of the following is the correct statement regarding instrumental methods for adulterant and toxin detection?
(A) GC-MS is highly effective for detecting and quantifying volatile organic adulterants in foods.
(B) HPLC is strictly limited to identifying and quantifying inorganic heavy metal ions in liquid samples.
(C) ELISA is a physical separation method that distinguishes compounds based on their specific boiling points.
(D) Thin Layer Chromatography provides far superior quantitative accuracy and analytical resolution than HPLC.

48. Consider the following statements regarding the classification of food toxins:
1. Solanine in green potatoes is a naturally occurring plant toxin.
2. Acrylamide formed during the deep-frying of potatoes is a process-induced toxin.
3. Aflatoxin B1 is classified as an intentional synthetic food additive.
4. Botulinum toxin is a microbial toxin produced by anaerobic bacteria.

Which of the statements given above are correct?
(A) 1, 2, and 4
(B) 2, 3, and 4
(C) 1, 3, and 4
(D) 1, 2, and 3

49. How are "process-induced toxins" best defined in food safety?
(A) Toxic chemical substances deliberately added during manufacturing to extend overall product shelf life.
(B) Harmful compounds formed by chemical reactions during cooking, baking, or fermentation.
(C) Bacterial toxins released by pathogenic organisms introduced during the clean packaging phase.
(D) Naturally occurring plant metabolites that are completely deactivated by standard thermal steps.

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50. Consider the following statements of Assertion (A) and Reason (R):
Assertion (A): Polycyclic Aromatic Hydrocarbons (PAHs) are classified as process-induced food toxins.
Reason (R): PAHs are typically formed when fat and juices from meat drip onto hot coals or heating elements, generating smoke that coats the food.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

51. Which of the following statements is incorrect regarding naturally occurring toxins in foods?
(A) Cyanogenic glycosides are naturally present in cassava and bitter almonds.
(B) Tetrodotoxin is a lethal marine toxin found in pufferfish.
(C) Hemagglutinins (lectins) in raw kidney beans can cause severe gastrointestinal distress if not properly cooked.
(D) Phytic acid, found in whole grains, acts as an extremely potent neurotoxin.

52. Match the toxins in List I with their classification/ origin in List II:
List I: (Toxin)
P. Acrylamide
Q. Tetrodotoxin
R. Aflatoxin
S. Solanine
List II: (Classification/Origin)
I. Microbial (Fungal) Toxin
II. Naturally occurring (Marine) Toxin
III. Naturally occurring (Plant) Toxin
IV. Process-induced Toxin
(A) P-IV, Q-II, R-I, S-III
(B) P-I, Q-III, R-IV, S-II
(C) P-IV, Q-I, R-II, S-III
(D) P-II, Q-IV, R-III, S-I

53. Which of the following analytical instruments is most suited for analyzing the presence of furan, a volatile process-induced toxin, in roasted coffee?
(A) High-performance liquid chromatography with fluorescence.
(B) Headspace gas chromatography-mass spectrometry.
(C) Atomic absorption spectrophotometry with graphite furnace.
(D) Capillary electrophoresis with diode array detector.

54. Which of the following represents the correct sequence of steps involved in the instrumental detection of trace adulterants using HPLC?
1. Chromatographic separation on a stationary phase column.
2. Sample extraction using an appropriate solvent.
3. Detection and quantification using a specific detector (e.g., UV-Vis or MS).
4. Sample cleanup (e.g., using Solid Phase Extraction) to remove matrix interferences.

(A) 2, 4, 1, 3
(B) 2, 1, 4, 3
(C) 1, 2, 3, 4
(D) 4, 2, 1, 3

55. Which of the following is NOT classified as a microbial food toxin?
(A) Pyrrolizidine alkaloid
(B) Staphylococcal enterotoxin
(C) Patulin
(D) Shiga toxin

56. Consider the following statements regarding acrylamide in food:
Statement I: Acrylamide is formed primarily via the Maillard reaction between the amino acid asparagine and reducing sugars at high temperatures.
Statement II: Boiling foods in water heavily promotes the formation of acrylamide compared to baking or frying.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

57. Consumption of potatoes that have been stored in bright light and developed a green tinge can lead to nausea, vomiting, and neurological symptoms. Which of the following toxins is primarily responsible for these symptoms?
(A) Aflatoxin
(B) Botulinum
(C) Histamine
(D) Solanine

58. For the rapid, on-site field screening of grain shipments for the presence of specific mycotoxins, which of the following analytical methods is most appropriate?
(A) Liquid chromatography-tandem mass spectrometry systems.
(B) High-resolution nuclear magnetic resonance spectrometry.
(C) Enzyme-linked immunosorbent lateral flow test kits.
(D) Fourier transform infrared spectroscopy instruments.

59. Which of the following is the correct pair of a naturally occurring toxin and its typical food source?
(A) Patulin – Pufferfish
(B) Gossypol – Cottonseed
(C) Saxitoxin – Red Kidney Beans
(D) Amygdalin – Peanuts

60. What is the cause-and-effect relationship leading to the presence of Heterocyclic Amines (HCAs) in food?
(A) Cause: Microbial fermentation of sugars; Effect: Rapid formation of HCAs in alcoholic drinks.
(B) Cause: Improper storage of grains in damp warehouses; Effect: Mold growth causing HCA synthesis.
(C) Cause: Addition of synthetic coloring agents; Effect: Gradual breakdown into toxic HCAs over time.
(D) Cause: High-temperature cooking of meats; Effect: Amino acids and creatine react to form HCAs.

61. Which of the following fungal species are the primary producers of aflatoxins in food commodities?
(A) Aspergillus flavus and Aspergillus parasiticus
(B) Penicillium expansum and Fusarium graminearum
(C) Claviceps purpurea and Alternaria alternata
(D) Rhizopus stolonifer and Mucor mucedo

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62. Which of the following is the correct statement regarding mycotoxins in food matrices?
(A) Aflatoxins represent highly heat-labile chemicals that are entirely destroyed during normal boiling.
(B) Ochratoxin A is a dangerous marine-derived biological toxin commonly found in shellfish species.
(C) Mycotoxins are mold-produced secondary metabolites contaminating crops pre- or post-harvest.
(D) Patulin is an extremely heat-stable bacterial toxin routinely recovered from pasteurized dairy milk.

63. Consider the following statements regarding the detection of mycotoxins:
1. ELISA provides rapid, high-throughput screening for mycotoxins based on antigen-antibody interactions.
2. HPLC combined with fluorescence detection is a highly sensitive quantitative method for aflatoxins.
3. Immunoaffinity columns (IAC) are completely ineffective for cleaning up mycotoxin extracts prior to HPLC.
4. Thin Layer Chromatography (TLC) relies on the natural fluorescence of aflatoxins under UV light.

Which of the statements given above are correct?
(A) 1, 2, and 4
(B) 1, 3, and 4
(C) 2, 3, and 4
(D) 1, 2, and 3

64. What is an Immunoaffinity Column (IAC) in the context of mycotoxin analysis?
(A) A glass column packed with activated charcoal granules designed to completely decolor complex extracts.
(B) An advanced mass detector measuring the mass-to-charge ratio of individual organic mycotoxin fragments.
(C) A specialized chromatography column dedicated exclusively to separating inorganic heavy metal ions.
(D) A device containing specific antibodies on a solid support to isolate and concentrate mycotoxins.

65. Consider the following statements of Assertion (A) and Reason (R):
Assertion (A): Aflatoxin M1 is routinely monitored in milk and dairy products.
Reason (R): Aflatoxin B1 ingested by lactating dairy animals through contaminated feed is metabolized in the liver and excreted in milk as Aflatoxin M1.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

66. Which of the following statements is incorrect regarding the use of Thin Layer Chromatography (TLC) for mycotoxin detection?
(A) TLC is an inexpensive and visually interpretable technique for initial screening of mycotoxins.
(B) Under long-wave UV light (365 nm), Aflatoxin B1 emits a blue fluorescence.
(C) TLC offers superior quantitative precision and lower limits of detection than LC-MS/MS.
(D) In TLC, the R_f (Retention factor) value helps in identifying the specific type of mycotoxin.

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67. Match the mycotoxins in List I with their primary target organs/diseases in List II:
List I: (Mycotoxin)
P. Aflatoxin B1
Q. Ochratoxin A
R. Ergot alkaloids
S. Zearalenone
List II: (Primary Target Organ / Disease)
I. Liver (Hepatocellular carcinoma)
II. Kidney (Nephropathy)
III. Estrogenic effects (Reproductive disorders)
IV. Central nervous system & vasculature (Ergotism)
(A) P-I, Q-III, R-II, S-IV
(B) P-IV, Q-II, R-I, S-III
(C) P-II, Q-I, R-IV, S-III
(D) P-I, Q-II, R-IV, S-III

68. When preparing a complex spice sample for trace aflatoxin quantification using HPLC, which of the following steps is recommended to prevent baseline noise and matrix interference?
(A) Passing the extract through an IAC to selectively bind and elute the target aflatoxins.
(B) Directly injecting the crude, unfiltered

organic solvent extract straight into the HPLC column.
(C) Boiling the raw extract for sixty minutes to completely precipitate potential matrix interferences.
(D) Adding a strong, highly concentrated oxidizing chemical to neutralize colored organic compounds.

69. Which of the following represents the correct sequence of steps for aflatoxin detection using Immunoaffinity Column (IAC) cleanup followed by HPLC?
1. Wash the column with water or a specific buffer to remove unbound impurities.
2. Load the filtered food extract onto the conditioned Immunoaffinity Column.
3. Elute the specifically bound aflatoxins using pure methanol or acetonitrile.
4. Inject the concentrated eluate into the HPLC system for separation and detection.

(A) 2, 1, 3, 4
(B) 1, 2, 4, 3
(C) 2, 3, 1, 4
(D) 3, 1, 2, 4

70. Which of the following compounds is NOT structurally classified as an aflatoxin?
(A) Aflatoxin B1
(B) Fumonisin B1
(C) Aflatoxin M2
(D) Aflatoxin G1

71. Consider the following statements regarding the instrumental analysis of aflatoxins:
Statement I: Aflatoxins exhibit natural fluorescence, allowing them to be detected using a Fluorescence Detector (FLD) coupled with HPLC.
Statement II: Derivatization of Aflatoxin B1 and G1 (such as with iodine or Kobra cell) is often required to enhance their fluorescence signal prior to FLD detection.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

72. When groundnuts are stored under conditions of elevated temperature and high relative humidity (above 85%), which of the following is the most imminent food safety risk?
(A) Autoxidation of lipids leading to purely aesthetic rancidity without toxicological concern.
(B) Spontaneous generation of acrylamide within the raw groundnuts.
(C) Proliferation of Aspergillus species leading to significant Aflatoxin B1 contamination.
(D) Immediate formation of botulinum toxin in the aerobic environment.

73. To accurately quantify Aflatoxin B1 in cereals at extremely low concentrations (such as 2 parts per billion), which of the following analytical approaches is most suitable?
(A) Relying strictly on rapid, visual colorimetric spot tests performed directly on raw grain surfaces.
(B) Utilizing high-temperature gas chromatography coupled directly to a flame ionization detector.
(C) Measuring the optical refractive index of the clarified organic solvent cereal grain extract.
(D) Employing HPLC with a fluorescence detector after rigorous immunoaffinity column cleanup.

74. Which of the following is the correct pair of mycotoxin and its most characteristic food matrix?
(A) Aflatoxin M1 – Groundnuts
(B) Deoxynivalenol (DON) – Milk
(C) Patulin – Apple juice
(D) Zearalenone – Dried figs

75. What is the cause-and-effect relationship regarding mycotoxin production in agricultural commodities?
(A) Cause: Grain storage at moisture levels well below ten percent; Effect: Sudden growth of Penicillium.
(B) Cause: Cereal exposure to high humidity and warmth; Effect: Mold growth and mycotoxin synthesis.
(C) Cause: Standard vacuum packaging of dry milled spices; Effect: Strict anaerobic synthesis of Aflatoxins.
(D) Cause: Low-dose gamma irradiation of raw groundnuts; Effect: Direct chemical conversion into Ochratoxin A.

76. Which biogenic amine is primarily responsible for scombroid poisoning in spoiled fish?
(A) Tyramine
(B) Cadaverine

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(C) Putrescine
(D) Histamine

77. Which of the following is the correct statement regarding biogenic amines in food?
(A) High levels of tyramine in aged cheeses can cause hypertensive crises in patients taking MAOIs.
(B) Tyramine is routinely found in exceptionally high levels within fresh, completely unfermented dairy milk.
(C) Biogenic amines are formed exclusively through thermal degradation of structural carbohydrates during cooking.
(D) Histamine accumulation in fish can be completely reversed by cooking the muscle tissue at high temperatures.

78. Consider the following statements regarding the detection of biogenic amines:
1. They are primarily detected using HPLC combined with UV or fluorescence detectors.
2. Derivatization (such as with dansyl chloride) is often required because many biogenic amines lack strong chromophores.
3. Biogenic amines can be reliably quantified simply by measuring the pH of the food matrix.
4. LC-MS/MS offers a highly sensitive and specific method for biogenic amine profiling without mandatory derivatization.

Which of the statements given above are correct?
(A) 1, 3, and 4
(B) 2, 3, and 4
(C) 1, 2, and 4
(D) 1, 2, and 3

79. How is a "biogenic amine" scientifically defined in food chemistry?
(A) A low-molecular-weight organic base formed mainly by decarboxylation of specific amino acids.
(B) A complex, high-molecular-weight structural protein synthesized exclusively by deep-sea marine algae species.
(C) An inorganic, ammonia-derived chemical additive deliberately added to fermented food matrices to halt rot.
(D) A synthetic, highly reactive dye compound structurally related to amino acids, used to boost food colors.

80. Consider the following statements of Assertion (A) and Reason (R):
Assertion (A): Scombroid poisoning resembles an allergic reaction but is actually a toxicological foodborne illness.
Reason (R): It is caused by the ingestion of food containing unusually high levels of pre-formed histamine, which triggers histamine receptors in the body directly, without the involvement of IgE antibodies.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

81. Which of the following statements is incorrect concerning veterinary drug residues in animal-derived foods?
(A) Excessive antibiotic use in dairy cattle can lead to residues in milk, which may inhibit starter cultures during cheese making.
(B) The presence of hormonal residues in meat poses no theoretical risk to human health, hence regulatory limits do not exist.
(C) Maximum Residue Limits (MRLs) are legally established thresholds for veterinary drugs in food products.
(D) Long-term consumption of sub-therapeutic antibiotic residues in food can contribute to antimicrobial resistance (AMR) in human pathogens.

82. Match the biogenic amines in List I with their precursor amino acids in List II:
List I: (Biogenic Amine)
P. Histamine
Q. Tyramine
R. Cadaverine
S. Putrescine
List II: (Precursor Amino Acid)
I. Tyrosine
II. Ornithine (or Arginine)
III. Histidine
IV. Lysine
(A) P-I, Q-III, R-II, S-IV
(B) P-III, Q-IV, R-I, S-II
(C) P-III, Q-I, R-IV, S-II
(D) P-IV, Q-I, R-II, S-III

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83. To prevent the formation of toxic levels of histamine in harvested tuna, which of the following measures is most critical?
(A) Treating the fish with high concentrations of sodium chloride immediately after catch.
(B) Soaking the fish in vinegar to neutralize the basicity of the amine.
(C) Subjecting the fresh fish to intense gamma irradiation prior to any temperature control.
(D) Rapidly chilling fish below 4°C after catch to inhibit bacterial histidine decarboxylase activity.

84. Which of the following is the incorrect pair regarding the detection of veterinary drugs or adulterants and their respective methods?
(A) Melamine in dairy – Refractometry
(B) Antibiotic residues in milk – Delvotest (microbial inhibition assay)
(C) Steroid hormones in meat – Liquid Chromatography-Tandem Mass Spectrometry (LC-MS/MS)
(D) Biogenic amines – HPLC with Dansyl Chloride derivatization

85. Which of the following compounds is NOT classified as a biogenic amine commonly associated with food spoilage or fermentation?
(A) Spermidine
(B) Aspartame
(C) Putrescine
(D) Cadaverine

86. Consider the following statements regarding antibiotic residues:
Statement I: The primary concern with chronic dietary exposure to low levels of antibiotic residues is the potential development of Antimicrobial Resistance (AMR) in the human microbiome.
Statement II: Boiling milk for 5 minutes completely degrades all classes of veterinary antibiotic residues, rendering the milk completely safe.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

87. Upon analytical confirmation of the presence of chloramphenicol (a banned broad-spectrum antibiotic) in aquaculture products, what is the required regulatory action?
(A) Condemn the product due to zero-tolerance policies linked to aplastic anemia risks.
(B) Permit commercial distribution after downgrading the official aquaculture quality score to 'Grade B'.
(C) Subject the harvested fish to heat processing to completely denature any chloramphenicol molecules.
(D) Clean raw fillets using hyper-chlorinated municipal water to completely wash away chemical residue.

88. When determining trace concentrations (parts per trillion) of synthetic growth hormones (such as Trenbolone) in complex meat matrices, which of the following analytical techniques is most appropriate?
(A) Running high-performance thin layer chromatography systems for rapid resolution.
(B) Measuring sample absorbance on basic UV spectrophotometers after simple water extraction.
(C) Employing high-precision LC-MS/MS assays for ultimate sensitivity and confirmatory verification.
(D) Performing rapid, manual acid-base titration assays directly on raw homogenized tissue.

89. Which of the following is the correct pair of a veterinary drug and its pharmacological class used in food animals?
(A) Clenbuterol – Synthetic coloring agent
(B) Recombinant Bovine Somatotropin (rBST) – Anthelmintic
(C) Ivermectin – Steroid hormone
(D) Oxytetracycline – Antibiotic

90. What is the fundamental cause-and-effect mechanism behind the presence of putrescine in spoiling meat?
(A) Cause: Accelerated autoxidation of free fatty acids; Effect: Production of rancid, oily off-odors.
(B) Cause: Sudden thermal breakdown of structural muscle glycogen; Effect: Direct release of the amine.
(C) Cause: Bacterial decarboxylation of ornithine; Effect: Synthesis of putrescine and foul odors.
(D) Cause: Non-enzymatic Maillard browning between reducing sugars; Effect: Thermal synthesis of amines.

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91. To which chemical class of synthetic dyes do the banned Sudan dyes (I, II, III, IV) belong?
(A) Triphenylmethane dyes
(B) Azo dyes
(C) Anthraquinone dyes
(D) Phthalocyanine dyes

92. Which of the following is the correct statement regarding Metanil Yellow?
(A) It represents a fully permitted, water-soluble synthetic food colorant safe for sweet products.
(B) It is a completely natural, plant-derived dye extracted directly from wild metanil shrub roots.
(C) It is designed exclusively for coloring gelatin pharmaceutical capsules with no human health risks.
(D) It is a banned synthetic dye used in turmeric powder that causes systemic toxicity.

93. Consider the following statements regarding banned food dyes:
1. Rhodamine B is an unpermitted fluorescent dye occasionally used to impart a red color to chilli powder or sweets.
2. Sudan dyes are lipophilic (fat-soluble) and are primarily used in industrial applications like coloring plastics and waxes.
3. The addition of Malachite Green to green vegetables is a safe, regulatory-approved practice to maintain freshness.
4. Consumption of foods adulterated with synthetic azo dyes like Sudan I is linked to potential carcinogenic and genotoxic effects.

Which of the statements given above are correct?
(A) 1, 2, and 4
(B) 2, 3, and 4
(C) 1, 3, and 4
(D) 1, 2, and 3

94. What is the defining chemical characteristic of melamine that led to its illegal use as a food adulterant?
(A) It possesses a highly intense, naturally sweet taste profile that perfectly mimics high-fructose corn syrup.
(B) It acts as a highly potent chemical emulsifier to prevent physical separation of butterfats in raw milks.
(C) It is rich in nitrogen (~66%), falsely inflating protein readings in standard nitrogen assays.
(D) It represents a highly stable chemical preservative that extends commercial milk shelf-lives indefinitely.

95. Consider the following statements of Assertion (A) and Reason (R):
Assertion (A): The Kjeldahl method cannot distinguish between true milk protein and melamine.
Reason (R): The Kjeldahl method measures the total nitrogen content in a sample, regardless of whether the nitrogen originates from amino acids or a non-protein nitrogenous compound like melamine.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

96. Which of the following statements is incorrect regarding the regulation of Sudan dyes in food?
(A) Sudan dyes are classified as strictly non-permitted synthetic colorants in food products globally.
(B) Sudan dyes are linked to high carcinogenicity and are classified as hazardous industrial substances.
(C) Regulatory laboratories require advanced methods like LC-MS/MS to detect trace levels of Sudan dyes.
(D) The maximum permitted level for Sudan I in chilli powder is 5 ppm according to Codex Alimentarius.

97. Match the banned dyes in List I with their typical colors/targeted foods in List II:
List I: (Banned Dye)
P. Metanil yellow
Q. Sudan Red
R. Rhodamine B
S. Malachite green
List II: (Typical Color Imparted / Targeted Food)
I. Bright red / Chilli powder & sweets
II. Yellow / Turmeric & gram flour (Besan)
III. Intense red / Palm oil & paprika
IV. Bright green / Green peas & chillies
(A) P-I, Q-II, R-III, S-IV
(B) P-II, Q-III, R-I, S-IV
(C) P-III, Q-I, R-IV, S-II
(D) P-II, Q-I, R-III, S-IV

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98. When isolating Sudan dyes from a sample of adulterated chilli powder using Thin Layer Chromatography (TLC), which of the following extraction solvents is most effective?
(A) Heavily deionized pure distilled water.
(B) Highly concentrated hydrochloric acid.
(C) Organic solvents like hexane or acetonitrile.
(D) Moderately strong sodium hydroxide solution.

99. Which of the following is the incorrect pair of a common adulterant and its corresponding rapid detection test?
(A) Metanil yellow in turmeric – Addition of concentrated HCl yields a magenta red color.
(B) Rhodamine B in sweets – Extraction with solvent and viewing under UV light shows fluorescence.
(C) Malachite green in vegetables – Rubbing on a wet white blotting paper leaves a green stain.
(D) Melamine in milk – Addition of iodine solution yields a deep blue color.

100. Which of the following coloring agents is NOT classified as a banned or unpermitted dye in food, assuming it is used within its regulatory Maximum Permitted Level (MPL)?
(A) Tartrazine
(B) Sudan III
(C) Metanil yellow
(D) Orange II

101. Consider the following statements regarding melamine toxicity:
Statement I: Melamine alone is acutely toxic and rapidly destroys liver cells upon ingestion.
Statement II: The severe renal toxicity of melamine is primarily due to its co-precipitation with cyanuric acid in the kidneys, forming insoluble crystals that cause renal failure.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

102. When an organic solvent extract of intensely bright red paprika powder is analyzed using HPLC, it reveals a prominent lipophilic peak that does not match natural carotenoids. What is the most probable adulterant?
(A) Cochineal extract (Carmine)
(B) A Sudan dye
(C) Riboflavin
(D) Anthocyanin

103. To achieve confirmatory identification and quantification of melamine in complex dairy matrices (such as infant formula), which of the following analytical techniques is universally recommended?
(A) Liquid Chromatography-Tandem Mass Spectrometry (LC-MS/MS).
(B) Standard manual Kjeldahl nitrogen titration assays.
(C) Automated Dumas high-temperature combustion methods.
(D) Direct Fourier Transform Infrared (FTIR) spectroscopy.

104. Which of the following is the correct pair of a banned dye and its characteristic visual appearance?
(A) Metanil Yellow – Fluorescent pink
(B) Sudan I – Concentrated jet black
(C) Malachite Green – Bright blue-green
(D) Rhodamine B – Intensely bright yellow

105. What is the fundamental cause-and-effect relationship associated with melamine adulteration in the dairy industry?
(A) Cause: Melamine destroys lactic bacteria; Effect: It permanently stops curdling to extend shelf life.
(B) Cause: Melamine reacts with free lactose; Effect: It creates sweet profiles to mask water dilution.
(C) Cause: Melamine complexes with free calcium; Effect: It prevents natural whey separation in cheese.
(D) Cause: Melamine is rich in nitrogen; Effect: It artificially elevates crude protein readings.

106. What is the typical purpose of applying higher doses (up to 10 kGy) of irradiation to dried spices?
(A) To prevent root sprouting and general vegetative growth.
(B) To artificially trigger and accelerate ripening steps.
(C) To significantly reduce pathogens and bacterial spores.
(D) To synthesize essential vitamins lost during air drying.

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107. Which of the following is the correct statement regarding Electron Paramagnetic Resonance (EPR) spectroscopy in the detection of irradiated foods?
(A) EPR measures structural and chemical alterations occurring in the natural lipid fractions of liquid food matrices.
(B) EPR is mainly used to detect stable free radicals trapped in rigid parts like bone, shell, or seeds.
(C) EPR relies on measuring cumulative light emissions when the food sample is dry heated above 300 degrees Celsius.
(D) EPR represents a highly transient screening assay that is strictly effective for foods irradiated inside 24 hours.

108. Consider the following statements regarding the Thermoluminescence (TL) method for detecting irradiated foods:
1. TL is based on the emission of light upon heating a sample that has been previously irradiated.
2. The method is highly effective for foods containing small amounts of silicate minerals (such as adhering dust on spices).
3. TL cannot differentiate between irradiated and non-irradiated samples if the silicate minerals are washed away prior to analysis.
4. TL strictly measures the isotopic ratio of carbon within the food matrix.

Which of the statements given above are correct?
(A) 1, 2, and 4
(B) 2, 3, and 4
(C) 1, 3, and 4
(D) 1, 2, and 3

109. How is Photostimulated Luminescence (PSL) defined in the context of analyzing irradiated food?
(A) A rapid screening method measuring light from trapped charge carriers stimulated by infrared pulses.
(B) A technique where the food matrix is dissolved in hot mineral acids to measure UV-stimulated fluorescence.
(C) The process of capturing high-resolution photos of food under polarizing lenses to count radiation scars.
(D) The natural, continuous bioluminescence emitted by surviving bacteria inside sterilized food containers.

110. Consider the following statements of Assertion (A) and Reason (R):
Assertion (A): The DNA Comet Assay can be used to screen for irradiated foods containing intact cells, such as fresh meats and certain seeds.
Reason (R): Ionizing radiation causes significant DNA strand breaks; during electrophoresis, these fragmented DNA pieces migrate faster, forming a characteristic "comet tail" under a microscope.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

111. Which of the following statements is incorrect regarding the purpose and effects of food irradiation?
(A) Irradiation induces a radioactive state in the food, making it slightly radioactive for several weeks.
(B) Irradiation can be used to inhibit the sprouting of potatoes and onions.
(C) Irradiation is a "cold pasteurization" technique that can eliminate pathogens without significantly raising the food's temperature.
(D) Irradiation is utilized for phytosanitary purposes to prevent the spread of invasive insect pests across borders.

112. Match the analytical methods in List I with the specific components analyzed for irradiation history in List II:
List I: (Analytical Method)
P. Electron Paramagnetic Resonance (EPR)
Q. Thermoluminescence (TL)
R. DNA Comet Assay
S. Gas Chromatography (GC-MS)
List II: (Specific Component Analyzed for Irradiation History)
I. Silicate mineral dust adhering to the food
II. DNA fragmentation (strand breaks)
III. Radiolytic products (such as volatile hydrocarbons or cyclobutanones) in fat
IV. Stable free radicals in rigid matrices (bones, shells)
(A) P-I, Q-IV, R-III, S-II
(B) P-IV, Q-II, R-I, S-III
(C) P-III, Q-I, R-II, S-IV
(D) P-IV, Q-I, R-II, S-III

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113. To verify whether a batch of chicken containing bone fragments has been subjected to irradiation, which of the following tests should be performed?
(A) Photostimulated Luminescence screening.
(B) EPR on the extracted bone fragments.
(C) Kjeldahl nitrogen determination assays.
(D) Atomic Absorption Spectrometric analysis.

114. Which of the following is the incorrect pair regarding irradiation terminology?
(A) Radura – The international symbol indicating a food product has been irradiated.
(B) Gray (Gy) – The derived unit of ionizing radiation dose, equivalent to one joule of energy absorbed per kilogram of matter.
(C) Cold sterilization – A process that relies exclusively on freezing food to absolute zero to destroy all microbes.
(D) Cobalt-60 – A common radioactive isotope used as a source of gamma rays for food irradiation.

115. Which of the following foods is least suitable for analyzing its irradiation status using the DNA Comet Assay?
(A) Fresh raw strawberries.
(B) Raw skinned chicken breast.
(C) Fresh raw whole onions.
(D) Highly refined vegetable oil.

116. Consider the following statements regarding the labeling of irradiated foods:
Statement I: Most food regulatory frameworks mandate that irradiated food packages prominently display the Radura symbol.
Statement II: The labeling must also clearly include text such as "Treated with radiation" or "Treated by irradiation."
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false but Statement II is true.
(D) Statement I is true but Statement II is false.

117. When a screening of fresh herbs using a portable Photostimulated Luminescence (PSL) device yields a strong positive signal (high photon count), what is the next logical step to confirm whether the herbs have been irradiated?
(A) Immediately condemn and destroy the import as it is deemed highly radioactive and toxic.
(B) Perform a confirmatory thermoluminescence test on the isolated silicate minerals.
(C) Approve the shipment directly at the port, as PSL only measures organic photosynthesis.
(D) Treat the herbs with high-intensity UV lamps to completely reverse the initial PSL signal.

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118. To differentiate between an irradiated and a non-irradiated batch of cumin seeds that carry trace amounts of soil dust, which of the following analytical methods provides the most definitive confirmation?
(A) Measuring total volatile oils with standard Clevenger extraction tools.
(B) Isolating the silicate minerals and applying Thermoluminescence.
(C) Performing simple aerobic plate counts to verify viable bacterial levels.
(D) Utilizing basic thin layer chromatography assays to look for Sudan dyes.

119. Which of the following is the correct pair of irradiation application and its typical targeted dose range?
(A) Sprout inhibition (e.g., potatoes) – Low dose (up to 0.15 kGy)
(B) Complete commercial sterilization of meat – Low dose (up to 1 kGy)
(C) Delay of physiological ripening in bananas – High dose (above 10 kGy)
(D) Elimination of bacterial spores in spices – Low dose (up to 0.5 kGy)

120. What is the fundamental cause-and-effect relationship evaluated in the DNA Comet Assay for irradiated foods?
(A) Cause: Ionizing radiation exposure; Effect: Cross-linking of proteins to form a highly dense nucleus.
(B) Cause: Irradiation of lipid fractions; Effect: Generation of cyclobutanones that look like comet shapes.
(C) Cause: Ionizing radiation exposure; Effect: DNA strand breaks allow outward migration during electrophoresis.
(D) Cause: Electron beam exposure; Effect: Rapid stimulation of DNA replication to form visible comet tails.

121. What constitutes the natural background radioactivity found in almost all living organisms and food sources?
(A) Strictly trace, microscopic quantities of artificial radioactive Cesium-137 from

weapon tests.
(B) Residual waste materials originating from the clinical diagnostic use of Technetium-99m.
(C) Heavily concentrated levels of Plutonium-239 absorbed directly from deep subterranean groundwater.
(D) Naturally occurring primordial radionuclides such as Potassium-40 and Carbon-14.

122. Which of the following is the correct statement regarding Cesium-137 (^{137}Cs) as a radionuclide of food safety concern?
(A) It represents a natural, harmless isotope discovered in exceptionally high concentrations in bananas.
(B) It has a very brief physical half-life of eight days, which classifies it strictly as a short-term hazard.
(C) It has a 30-year physical half-life and mimics potassium, distributing throughout soft tissues.
(D) It only emits low-energy alpha particles, which cannot penetrate outer skin but are harmful if swallowed.

123. Consider the following statements regarding radionuclides of concern in food safety:
1. Strontium-90 (^{90}Sr) mimics calcium chemically and tends to accumulate in the bones and teeth.
2. Iodine-131 (^{131}I) is heavily concentrated by the human thyroid gland upon ingestion.
3. Cesium-137 (^{137}Cs) is exclusively an alpha emitter, making gamma spectrometry useless for its detection.
4. The biological half-life of a radionuclide is often different from its physical radioactive half-life.

Which of the statements given above are correct?
(A) 1, 2, and 3
(B) 1, 2, and 4
(C) 2, 3, and 4
(D) 1, 3, and 4

124. In the context of food radioactivity measurement, how is a "Becquerel (Bq)" defined?
(A) The amount of radiation energy absorbed per kilogram of human tissue.
(B) The biological equivalent dose of gamma radiation.
(C) The concentration of a radionuclide in parts per million.
(D) One radioactive decay event (disintegration) per second.

125. Consider the following statements of Assertion (A) and Reason (R):
Assertion (A): Following a nuclear accident, authorities often swiftly ban the consumption of fresh milk produced in the immediate fallout zone.
Reason (R): Grazing dairy cattle can rapidly ingest fallout containing Iodine-131, which is then swiftly secreted into their milk, posing a high risk of thyroid exposure, especially to children.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

126. Which of the following statements is incorrect concerning regulatory limits for radioactivity in food?
(A) Guideline levels are established for radionuclides in foods following accidental nuclear contamination events.
(B) Regulatory limits for radionuclide presence are almost always expressed in units of Becquerels per kilogram.
(C) Foods exceeding these guideline levels are legally permitted for sale if boiled prior to consumption.
(D) Acceptable safety limits for radionuclides are always significantly stricter for infant food commodities.

127. Match the radionuclides in List I with their target organs/chemical mimicry in List II:
List I: (Radionuclide)
P. Iodine-131
Q. Strontium-90
R. Cesium-137
S. Potassium-40
List II: (Target Organ / Chemical Mimicry)
I. Mimics Calcium / Accumulates in Bone
II. Mimics Potassium / Distributes in Soft Tissue
III. Accumulates heavily in the Thyroid Gland
IV. Natural isotope / Homeostatically controlled in the body
(A) P-III, Q-I, R-II, S-IV
(B) P-I, Q-III, R-IV, S-II

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(C) P-III, Q-II, R-I, S-IV
(D) P-II, Q-I, R-III, S-IV

128. In the first two weeks following a nuclear fallout event, which specific radionuclide should milk from pasture-fed cows in the affected area be urgently tested for?
(A) Carbon-14
(B) Uranium-235
(C) Strontium-90
(D) Iodine-131

129. Which of the following is the incorrect pair regarding artificial radionuclides and their approximate physical half-lives?
(A) Iodine-131 – Physical half-life of 8 days
(B) Cesium-134 – Half-life of 14 million years
(C) Cesium-137 – Physical half-life of 30 years
(D) Strontium-90 – Physical half-life of 29 years

130. Which of the following is NOT considered a primary artificial radionuclide of food safety concern resulting from nuclear fallout or reactor accidents?
(A) Cesium-137 (^{137}Cs)
(B) Strontium-90 (^{90}Sr)
(C) Radon-222 (^{222}Rn)
(D) Iodine-131 (^{131}I)

131. Consider the following statements regarding the detection of radioactivity in food:
Statement I: Gamma spectrometry using High-Purity Germanium (HPGe) detectors allows for the simultaneous identification and quantification of multiple gamma-emitting radionuclides in a food sample.
Statement II: The sample analyzed via gamma spectrometry usually requires extensive chemical extraction and digestion prior to measurement.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

132. In the immediate aftermath of a nuclear accident, which of the following crop types presents the most immediate risk of direct surface contamination from radioactive fallout?
(A) Broad-leafed vegetables due to direct surface deposition.
(B) Deep-rooted tubers harvested from deep, clean soil zones.
(C) Hydroponic greenhouse tomatoes grown in closed water loops.
(D) Net-covered hanging apples protected by heavy outer plastic.

133. When preparing a food sample (such as meat or milk) for quantification of purely beta-emitting Strontium-90 (^{90}Sr), which of the following analytical approaches is required?
(A) Direct non-destructive placement of the raw, untreated food sample directly into a gamma spectrometer.
(B) Ashing and radiochemical separation followed by beta counting on a proportional counter.
(C) Rapid visual inspection under a long-wave ultraviolet lamp to check for characteristic fluorescence.
(D) Boiling the homogenized food sample to volatilize strontium elements for standard gas chromatography.

134. Which of the following is the correct pair of radiation detection instrument and its primary application in food safety?
(A) Handheld GM Counter – High-precision identification of specific isotopic energy signatures.
(B) Gamma Spectrometer – Quantification of specific gamma-emitters like Cesium-137.
(C) Liquid Scintillation Counter – Rapid detection of alpha-emitting gaseous radon in the atmosphere.
(D) UV Spectrophotometer – Precise measurement of total beta activity levels in liquid milk samples.

135. What is the fundamental cause-and-effect relationship regarding the ingestion of Strontium-90 contaminated food?
(A) Cause: Ingestion of ^{90}Sr; Effect: It replaces calcium in bone, raising leukemia and bone cancer risks.
(B) Cause: Ingestion of ^{90}Sr; Effect: It heavily accumulates in thyroid tissue to trigger acute hyperthyroidism.
(C) Cause: Ingestion of ^{90}Sr; Effect: It acts as a highly potent neurotoxic agent that triggers rapid muscular paralysis.
(D) Cause: Ingestion of ^{90}Sr; Effect: It directly catalyzes the rapid breakdown of ascorbic acid causing severe scurvy.

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136. What is the underlying working principle of a Geiger-Müller (GM) counter used for preliminary screening of radioactive contamination?
(A) It measures structural heat changes generated by continuous radioactive decay processes in the sample.
(B) It detects the specific, narrow wavelength of visible light emitted when radiation strikes a crystal.
(C) It relies on gas ionization in a tube by radiation, creating a measurable electrical pulse.
(D) It measures microscopic changes in the nuclear magnetic resonance properties of the surrounding food.

137. Which of the following is the correct statement regarding gamma spectrometry in food analysis?
(A) It can only analyze one target radionuclide per test run, requiring separate scans for Cesium and Iodine.
(B) It requires complete chemical destruction and combustion of the food sample to release trapped gamma rays.
(C) It is entirely incapable of detecting Cesium-137 isotopes because they strictly release beta particles.
(D) It is a non-destructive method identifying radionuclides by the unique energy peaks of gamma photons.

138. Consider the following statements regarding regulatory actions and limits for radioactivity in food:
1. International guideline levels (GLs) apply specifically to food destined for human consumption and traded internationally following a nuclear emergency.
2. These GLs separate radionuclides into different groups based on their dose per unit intake (radiotoxicity).
3. If the measured radioactivity in a food item exceeds the GL, it is generally deemed unfit for human consumption.
4. Washing or peeling contaminated fruits can completely eliminate internal radioactivity absorbed through the roots.

Which of the statements given above are correct?
(A) 1, 3, and 4
(B) 2, 3, and 4
(C) 1, 2, and 3
(D) 1, 2, and 4

139. How are "emergency response interventions" best defined in the context of radioactive food contamination?
(A) Preventive agricultural measures implemented decades prior to any nuclear event to build radiation resistance.
(B) Protective actions like food embargoes or sheltering implemented to restrict public exposure after an emergency.
(C) The process of intentionally applying ionizing radiation to agricultural fields to sterilize topsoil post-disaster.
(D) The rapid, mass deployment of broad-spectrum antibiotics to the local population to cure acute radiation sickness.

140. Consider the following statements of Assertion (A) and Reason (R):
Assertion (A): In the immediate days following a radiological fallout, thoroughly washing and peeling root vegetables can significantly reduce their radioactive contamination.
Reason (R): Early phase contamination is often strictly superficial, resulting from the direct atmospheric deposition of radioactive dust onto the exterior of the plant or soil.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

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141. Which of the following statements is incorrect comparing physical and biological half-lives of radionuclides?
(A) Boiling or cooking food heavily reduces the physical half-life of Cesium-137 from 30 years down to a few days.
(B) The physical half-life (T_p) is a constant determined by quantum mechanics and cannot be changed by physical or chemical processing.
(C) The biological half-life (T_b) represents the time required for a biological system (like the human body) to eliminate half of the substance through natural metabolic processes.
(D) The effective half-life (T_e) considers both the physical decay and biological excretion rates.

142. Match the emergency response phases/actions in List I with their descriptions in List II:
List I: (Emergency Response Phase / Action)
P. Pre-release / Early phase
Q. Intermediate phase
R. Food Embargo
S. Remediation
List II: (Description)
I. Restricting movement and sale of potentially contaminated food
II. Long-term strategies like deep plowing of contaminated soil
III. Sheltering animals and securing clean water/ feed supplies
IV. Extensive environmental sampling and ongoing dietary monitoring
(A) P-I, Q-II, R-III, S-IV
(B) P-IV, Q-III, R-II, S-I
(C) P-III, Q-IV, R-I, S-II
(D) P-III, Q-I, R-IV, S-II

143. When an embargo is imposed on the harvesting of leafy greens in an area due to radioactive contamination following a nuclear incident, can the crop be cleared for consumption by washing it with bleach?
(A) No, because washing does not guarantee removal of internal or superficial contamination.
(B) Yes, bleach chemically neutralizes radioactive isotopes to render the food completely safe.
(C) Yes, provided the leafy greens are washed thoroughly and frozen immediately for 48 hours.
(D) No, because household bleach converts Cesium-137 into highly toxic gaseous chlorine forms.

144. Which of the following is the incorrect pair regarding the units and concepts of radiation measurement?
(A) Becquerel (Bq) – Unit of radioactivity that represents one decay event per second.
(B) Sievert (Sv) – Unit of equivalent dose reflecting biological impact of radiation.
(C) Gamma rays – High-energy electromagnetic radiation showing massive penetrating power.
(D) Physical half-life – Time required for the body to excrete half of an ingested isotope.

145. Which of the following is considered an unacceptable mitigation strategy for managing milk heavily contaminated with Iodine-131 (exceeding regulatory limits) shortly after a nuclear accident?
(A) Processing the milk into long-aged cheeses, allowing the Iodine-131 (8-day half-life) to decay naturally before consumption months later.
(B) Boiling the milk vigorously for 10 minutes to instantly destroy the radioactivity before giving it to infants.
(C) Diverting the milk strictly to non-food industrial uses.
(D) Disposing of the milk safely according to environmental radioprotection guidelines.

146. Consider the following statements regarding the guideline levels (GLs) for radionuclides:
Statement I: These GLs are designed to apply to food consumed routinely over a lifetime under normal circumstances.
Statement II: The GL for infant foods is generally set at a lower (stricter) threshold than for general consumption foods, due to the higher radio-sensitivity of infants.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false but Statement II is true.
(D) Statement I is true but Statement II is false.

147. When preliminary screening of a shipment of wild-foraged mushrooms with a handheld Geiger-Müller (GM) counter triggers a high alarm for radioactive contamination, what is the most appropriate next step?
(A) Approve the mushroom shipment directly, as wild fungi naturally possess elevated Carbon-14 isotopes.
(B) Reject the import based strictly on the portable GM reading and trigger a full local seaport evacuation.
(C) Request the import team to wash mushrooms with basic solutions to neutralize outer radioactive dust.
(D) Detain the shipment and send samples for HPGe gamma spectrometry to quantify specific isotopes.

148. To properly assess the safety of a food matrix contaminated with mixed fallout, which approach is required to differentiate between Alpha, Beta, and Gamma emitters?
(A) Employing separate methods: alpha/beta require destructive chemistry, while gamma

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can be non-destructive.

(B) Running a basic visual test under ultraviolet light where alpha shows red, beta shows blue, and gamma is clear.

(C) Utilizing a single, portable Geiger-Müller counter to quickly identify emission types by audibly clicking.

(D) Measuring the internal heat of the food shipment, since alpha-emitting isotopes release far more thermal energy.

149. Which of the following is the correct pair of a radioprotection concept and its application in food safety?

(A) Biological half-life – Thermal processes like heating food to accelerate physical isotopic decay.

(B) ALARA – Implementing strict monitoring to minimize population exposure to dietary radionuclides.

(C) Roentgen equivalent man (rem) – The standard metric SI unit representing physical mass of particles.

(D) Background radiation – High-level lethal radiation doses created within active nuclear power cores.

150. What is the fundamental cause-and-effect relationship of employing "delayed harvesting" as an agricultural countermeasure following a radiological emergency?

(A) Cause: Leaving crops unharvested; Effect: Plants synthesize chemical lead shields to block incoming radiation.

(B) Cause: Delaying harvest; Effect: Allows decay of short-lived isotopes, reducing contamination levels.

(C) Cause: Leaving crops unharvested; Effect: Atmospheric solar radiation completely purifies contaminated plant tissue.

(D) Cause: Leaving crops unharvested; Effect: Radioactive isotopes biochemically mutate into stable organic vitamins.

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ANSWERS

1. (B) The intentional addition of inferior substances or extraction of nutrients, making food unsafe.
Food adulteration involves the deliberate alteration of food quality through the addition of cheap, foreign, or harmful substances or the subtraction of key nutritional components. This practice is primarily driven by economic gain to increase bulk or conceal spoilage, which significantly compromises food safety and poses serious health risks to unsuspecting consumers.

2. (C) Metallic contamination from processing equipment is classified as incidental adulteration.
Incidental adulteration occurs unintentionally due to negligence, poor storage, or processing practices rather than deliberate action. Metallic contamination from machinery, pesticide residues, and insect infestation are primary examples of this type. In contrast, intentional adulteration involves the purposeful addition of harmful or cheaper substitutes to maximize profit margins at the cost of safety.

3. (D) 1 and 3
Urea is added to adulterated milk to artificially elevate the non-protein nitrogen content, which falsely inflates the solid-not-fat calculations. Detergents are mixed into diluted milk to emulsify added vegetable oils, thereby mimicking the natural frothing and physical appearance of pure milk. Starch is used to increase viscosity, while added water reduces specific gravity.

4. (A) Any material which is or could be employed for making the food unsafe, sub-standard, or misbranded.
An adulterant is defined in food safety regulations as any substance or material utilized to render a food product unsafe, substandard, or misbranded. This encompasses chemical, physical, or biological agents that reduce quality or deceive consumers. It excludes legally approved additives used within permissible limits to enhance stability, taste, or nutritional profile.

5. (A) Both A and R are true and R is the correct explanation of A.
Adding water to whole milk dilutes the overall system, which significantly lowers the concentration of solid-not-fat components like proteins, lactose, and essential minerals per unit volume. Because these non-fat solids are dissolved in the aqueous phase of the milk, any dilution directly and proportionally reduces their percentage, confirming that water acts as an effective diluent.

6. (B) A positive test for starch in milk yields a distinct brick-red precipitate upon heating.
Starch in milk is detected using an iodine solution, which reacts with the amylose component to form a characteristic blue-black complex. A brick-red precipitate is typical of Fehling's or Benedict's tests for reducing sugars, not the iodine starch test. Starch is commonly added to offset the density drop caused by watering down milk.

7. (A) P-III, Q-I, R-IV, S-II
Identifying milk adulterants requires specific analytical reagents and methods. Urea reacts with p-Dimethylaminobenzaldehyde to form a yellow complex, while cane sugar is detected using resorcinol in hydrochloric acid, producing a red color. Starch forms a blue-black complex with iodine, and added water is measured through specific gravity using a calibrated lactometer.

8. (C) Urea reacts with acidic DMAB reagent to produce a characteristic yellow-colored complex.
The detection of urea in milk using p-Dimethylaminobenzaldehyde relies on a direct condensation reaction. In an acidic medium, the active aldehyde group of the reagent condenses with the amine groups of urea, resulting in a stable yellow-colored complex. This colorimetric change allows for rapid qualitative and quantitative spectrophotometric estimation of added urea.

9. (A) 2, 4, 1, 3
Detecting anionic detergents in milk begins by pipetting the sample into a tube and adding methylene blue dye to form an active complex. Chloroform is then added to extract this lipophilic dye-detergent complex through thorough mixing. The positive result is confirmed by observing an intense blue color concentrating in the lower chloroform layer during phase separation.

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10. (C) To enhance the natural microbial fermentation process for yogurt production.
Detergents are added to watered-down milk to emulsify externally introduced vegetable fats and artificially mimic the natural thick texture and frothing properties of pure milk. However, detergents are highly toxic to microorganisms and inhibit, rather than enhance, the lactic acid bacteria required for yogurt fermentation, making fermentation enhancement a completely implausible reason for their addition.

11. (A) Both Statement I and Statement II are true.
Richmond's formula is a widely accepted mathematical tool used in dairy chemistry to estimate the solids-not-fat percentage of milk. This formula utilizes the corrected lactometer reading, which represents the specific gravity of the milk sample at a standard temperature, alongside the fat percentage determined by quantitative methods like the Gerber test to calculate total non-fat solids.

12. (D) The milk has been adulterated with a thickening carbohydrate, specifically starch.
When milk is adulterated with starch to artificially increase its thickness and viscosity, heating followed by the addition of iodine triggers a chemical reaction. Iodine intercalates into the helical structure of amylose, producing a deep blue-black color. This specific color change confirms the presence of starch rather than protein denaturation, fermentation, or whey protein addition.

13. (A) Gravimetric analysis by evaporating the sample to dryness in a standard hot air oven.
Gravimetric analysis is the most reliable and definitive method for determining the total solids content of milk. By evaporating a known mass of the sample to absolute dryness under controlled temperatures in a hot air oven, all water is removed. The remaining dry residue is weighed precisely, providing a direct measurement of the total solids present.

14. (C) Hydrogen peroxide – Paraphenylenediamine
Hydrogen peroxide, used illegally as a milk preservative, is detected using paraphenylenediamine, which undergoes oxidation to produce a blue color. Formaldehyde is typically detected using Hehner's reagent, which contains sulfuric acid and ferric chloride, while rosolic acid is used to detect neutralizing agents like sodium carbonate. Gelatin is detected using picric acid solution.

15. (A) Cause: Neutralizer addition; Effect: Masks high acidity to prevent heat coagulation.
Alkaline neutralizers like sodium carbonate or sodium hydroxide are added to stale milk to neutralize the lactic acid produced by bacterial growth. This artificial reduction in acidity prevents the milk from curdling or coagulating during mandatory heat processing steps like pasteurization, thereby allowing sub-standard, high-acid milk to be processed and sold as fresh milk.

16. (D) Nitric acid test
The nitric acid test is the classic chemical method used to detect the presence of toxic argemone oil in edible mustard oil. When the oil is treated with concentrated nitric acid and heated, the alkaloids sanguinarine and dihydrosanguinarine react to produce a characteristic reddish-brown color, indicating the presence of this dangerous adulterant in the sample.

17. (B) Vegetable ghee adulterated with animal fats is detected using the phytosterol acetate test.
The phytosterol acetate test is a reliable analytical method used to detect the adulteration of vegetable ghee with animal fats. This test relies on isolating sterols, converting them to acetates, and measuring their melting points, as animal fats contain cholesterol whereas vegetable oils contain phytosterols. Saponification, iodine value, and specific gravity also help distinguish fat types.

18. (C) 1, 2, and 4
The Baudouin test detects sesame oil using furfural and hydrochloric acid, while the Halphen test is specific for cottonseed oil. Mineral oil, being unsaponifiable, is identified by analyzing the unsaponifiable matter. Argemone oil is highly toxic, causing epidemic dropsy, meaning it is not harmless and severely impacts consumer health rather than just flavor.

19. (D) A non-edible petroleum hydrocarbon that cannot be saponified by alkali.
Mineral oil is defined as a liquid mixture of hydrocarbons obtained from petroleum processing. In food chemistry, it is classified as a non-edible substance because it completely lacks fatty acid esters. Consequently, it cannot undergo saponification when treated with an alkali, a key

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chemical property used to detect its presence as an adulterant in edible fats.

20. (A) Both A and R are true and R is the correct explanation of A.
Regulations mandate the addition of a small percentage of sesame oil to hydrogenated vegetable oil, also known as vanaspati. This legal requirement ensures that if cheap vanaspati is used to adulterate expensive pure ghee, it can be easily and rapidly detected using the highly sensitive Baudouin colorimetric test, which reacts specifically with sesamolin present in sesame oil.

21. (B) The test involves the isolation of sterols from the saponifiable fraction of the oil.
The phytosterol test involves isolating sterols from the unsaponifiable fraction of the fat, rather than the saponifiable fraction. Since sterols do not react with alkali to form soap, they remain in the unsaponifiable portion. This fraction is extracted with organic solvents, crystallized as acetates, and analyzed by melting point or gas chromatography to distinguish animal and plant sterols.

22. (B) P-II, Q-I, R-IV, S-III
Edible oil adulteration is verified through distinct chemical reactions. The Baudouin test identifies sesame oil in ghee via a pink color reaction. The nitric acid test detects toxic argemone oil in mustard oil, whereas the Halphen test identifies cyclopropenoid fatty acids in cottonseed oil. Holde's test is used to detect non-glyceride mineral oil through alkaline turbidity.

23. (A) The ghee is adulterated with vanaspati containing sesame oil.
The development of a permanent crimson-red color in the acid layer when treating a melted ghee sample with furfural and hydrochloric acid is a positive Baudouin test. This reaction occurs because the acid reacts with sesamolin, a compound found uniquely in sesame oil. Since sesame oil is legally mandated in vanaspati, this confirms vanaspati adulteration.

24. (A) 2, 1, 4, 3
The phytosterol test begins by saponifying the fat sample using alcoholic potassium hydroxide. Next, the unsaponifiable matter, containing the sterols, is extracted using an organic solvent like diethyl ether. These isolated sterols are then converted into their acetate derivatives, and the melting points of the crystallized acetates are determined to differentiate cholesterol from phytosterols.

25. (D) Iodine value
Iodine value measures the degree of unsaturation in fatty acids and is not a specific parameter for mineral oil detection. In contrast, mineral oil consists of petroleum hydrocarbons that cannot be saponified. Thus, mineral oil adulteration is detected by a decreased saponification value, increased unsaponifiable matter percentage, and turbidity in Holde's alkaline saponification test.

26. (A) Both Statement I and Statement II are true.
Argemone oil is extracted from the seeds of Argemone mexicana, which contain highly toxic benzophenanthridine alkaloids, including sanguinarine and dihydrosanguinarine. Consumption of mustard oil contaminated with argemone oil leads to epidemic dropsy, a severe pathological condition characterized by bilateral leg swelling, erythema, cardiac congestive failure, hepatic enlargement, and potentially death.

27. (B) Performing gas chromatography of sterols to detect altered cholesterol-to-phytosterol ratios.
Detecting animal depot fat like lard in pure cow ghee is achieved by gas chromatography analysis of the sterol fraction. While pure ghee contains cholesterol, vegetable fats contain phytosterols. Altered ratios of specific sterols and fatty acids provide a chemical fingerprint that reveals the presence of foreign fats, offering far higher sensitivity than basic physical or colorimetric tests.

28. (D) Gas chromatography profiling of fatty acid methyl esters.
Gas chromatography profiling of fatty acid methyl esters is the gold standard for quantifying individual vegetable oils within a blend. Every plant oil possesses a unique, genetically determined fatty acid profile. Converting these triglycerides into volatile methyl esters and separating them by gas chromatography allows analysts to determine the exact percentages of each oil present in the mixture.

29. (A) Argemone oil – Epidemic Dropsy
The ingestion of edible oil contaminated with toxic argemone oil leads directly to epidemic dropsy, a disease characterized by severe edema, cardiac arrest, and gastrointestinal issues. Other incorrect pairings include mineral oil causing

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gastrointestinal issues rather than lathyrism, and tricresyl phosphate causing paralysis rather than scurvy, while castor oil acts as a severe laxative.

30. (C) Cause: Ingestion of TCP; Effect: Cholinesterase inhibition leading to polyneuropathy.
Ingestion of tricresyl phosphate, an industrial plasticizer sometimes used as a toxic oil adulterant, inhibits the enzyme neurotoxic esterase and cholinesterase. This biochemical inhibition leads directly to delayed organophosphorus-induced polyneuropathy, characterized by flaccid paralysis of the lower limbs, muscle wasting, and sensory impairment, rather than affecting vitamin absorption, erythrocyte integrity, or blood glucose levels.

31. (A) Concentrated hydrochloric acid
Concentrated hydrochloric acid is the primary reagent used for the rapid spot detection of metanil yellow in turmeric powder. Metanil yellow is an acid-base indicator dye. When treated with concentrated acid, the dye undergoes protonation, resulting in an immediate and highly visible color shift from yellow to a deep magenta-red, confirming the presence of this unpermitted colorant.

32. (D) Brick powder and Sudan dyes are used to increase bulk and impart a bright red color.
Chilli powder is frequently adulterated with brick powder, sawdust, and synthetic Sudan dyes. Brick powder increases the physical weight and bulk of the spice, while Sudan dyes, which are toxic industrial azo colorants, impart an appealing, bright red appearance. Exhausted chilli waste actually lowers capsaicin content, while lead chromate is associated with yellow turmeric adulteration.

33. (B) 1, 2, and 3
Papaya seeds physically resemble black pepper and are common adulterants, while coriander powder is frequently mixed with sawdust or dung. Turmeric powder is sometimes colored with toxic lead chromate, causing lead poisoning. However, expensive cinnamon bark is frequently adulterated with cheaper, morphologically similar cassia bark, which makes the fourth statement completely incorrect in food safety analysis.

34. (C) Tea leaves from which active soluble components like caffeine and tannins have been extracted.
Exhausted tea refers to processed tea leaves that have already been brewed or chemically extracted to remove their active, soluble chemical components like caffeine, catechins, and tannins. These spent leaves are then dried, sometimes artificially re-colored using synthetic dyes, and illegally blended with fresh tea leaves to increase the net volume and weight of the product.

35. (A) Both A and R are true and R is the correct explanation of A.
Chicory root powder is classified as a food adulterant when added to pure coffee without explicit labeling. Chicory is a cheap agricultural substitute that lacks caffeine entirely, but once roasted and ground, it closely mimics the color, bitter flavor profile, and water solubility of coffee, making it an economically attractive but deceptive additive for unscrupulous manufacturers.

36. (A) Pure honey has a natural tendency to crystallize, which indicates it is heavily adulterated with table sugar.
Crystallization is a natural physical process for pure honey, driven by its high supersaturated concentration of glucose, and does not indicate adulteration. Conversely, honey is frequently adulterated with high-fructose corn syrup and invert sugar. Advanced isotopic mass spectrometry is the standard method used to detect added sugars originating from C4 plants like cane and corn.

37. (B) P-III, Q-I, R-IV, S-II
Spices are frequently targeted for economic adulteration using specific materials. Black pepper is adulterated with dried papaya seeds, while turmeric powder is colored with toxic lead chromate. Chilli powder is often spiked with industrial Sudan Red dye to enhance its red appearance, and coriander powder is commonly bulked out using organic sawdust or dung powder.

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38. (B) The turmeric is adulterated with a starch-based filler like wheat or rice flour.
Raw turmeric contains minimal free starch that reacts under these conditions. The appearance of a blue-black color upon adding iodine solution to powdered turmeric indicates adulteration with starch-based fillers, such as wheat, corn, or rice flour. Iodine molecules slip into the amylose helix

of the starch, creating a dark colored complex that exposes the non-permitted filler.

39. (A) 4, 2, 1, 3
Detecting C4 sugar in honey begins with preparing the sample and isolating its internal protein fraction. Next, the honey and protein undergo complete high-temperature combustion, converting organic carbon into carbon dioxide gas. This gas is analyzed via isotope ratio mass spectrometry to measure the carbon isotope ratios, and the final isotopic difference confirms the presence of C4 sugars.

40. (C) Argemone seeds
Argemone seeds are highly toxic seeds that physically resemble mustard seeds and are used specifically to adulterate mustard seeds and oil, rather than ground spices. Coriander powder, being a dry, light brown ground spice, is typically bulked up with powdery organic wastes like sawdust, horse dung, and agricultural bran, which match its color and texture.

41. (C) Statement I is true but Statement II is false.
Plants utilize different photosynthetic pathways, resulting in C4 plants like corn and sugar cane having a distinct carbon-13 signature compared to C3 plants. Adding C4 sugars to honey, which is primarily C3 based, shifts its delta carbon-13 value to be less negative, not more negative, allowing analysts to detect the adulteration using isotope ratio mass spectrometry.

42. (C) The tea leaves have been coated with a water-soluble synthetic dye.
Pure, unadulterated tea leaves require hot water to extract their natural catechins and pigments, releasing color very slowly in cold water. The instantaneous release of a bright red-brown color in cold water indicates that the tea leaves have been illegally coated with a highly soluble synthetic dye, a practice used to make exhausted tea appear fresh.

43. (B) Sprinkling the powder on cold water; coffee floats whereas chicory quickly sinks, leaving a distinct brown trail.
Sprinkling the powder on cold water is a simple and effective physical test to distinguish coffee from chicory. Coffee particles contain natural oils, making them hydrophobic, so they float on the surface. Conversely, chicory root powder is highly hydrophilic, absorbing water rapidly to sink to the bottom while releasing a prominent, visible brown trail of caramelized sugars.

44. (D) Honey – Fiehe's test for invert sugar
Fiehe's test is the classic chemical method used to detect the presence of invert sugar in honey by reacting with hydroxymethylfurfural, which produces a red color. The Halphen test is specific for cottonseed oil, the Baudouin test is for sesame oil, and the nitric acid test detects argemone oil, making the other options chemically mismatched.

45. (A) Cause: Using a strong magnet; Effect: Metallic iron filings are attracted and separated from the tea.
The presence of magnetic iron filings in tea, often introduced during grinding or to artificially increase weight, is resolved through physical separation. Passing a strong magnet through the dry tea sample attracts the ferromagnetic iron filings, pulling them away from the non-magnetic organic tea leaves. This allows for rapid and non-destructive detection and quantification of the metallic contaminant.

46. (C) Ergot alkaloid
Ergot alkaloids are toxic compounds produced by the fungus Claviceps purpurea, which infects cereal grains like rye under humid conditions. Ingestion of contaminated grain causes ergotism, historically referred to as St. Anthony's Fire, a disease characterized by severe vasoconstriction leading to gangrene, burning sensations in the limbs, hallucinations, and convulsions due to central nervous system effects.

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47. (A) GC-MS is highly effective for detecting and quantifying volatile organic adulterants in foods.
Gas Chromatography-Mass Spectrometry is a highly sensitive and specific analytical tool ideal for separating, identifying, and quantifying volatile and semi-volatile organic compounds in food matrices. High-Performance Liquid Chromatography is used for non-volatile organic compounds rather than inorganic heavy metals, while enzyme-linked immunosorbent assays rely on immunological antibody binding rather than physical boiling point separation.

48. (D) 1, 2, and 3
Food toxins are categorized by their origin into natural plant toxins, microbial toxins, and process-induced compounds. Solanine represents a glycoalkaloid found naturally in nightshade

plants like green potatoes. Acrylamide is a toxic compound formed during high-temperature thermal processing of starchy foods. Aflatoxins are fungal metabolites, while botulinum toxins are potent proteins produced under anaerobic conditions by bacteria.

49. (B) Harmful compounds formed by chemical reactions during cooking, baking, or fermentation.
Process-induced toxins are chemical contaminants that are not naturally present in raw food ingredients but are generated during food processing operations such as high-temperature cooking, baking, deep-frying, roasting, or fermentation. Examples include acrylamide, heterocyclic amines, polycyclic aromatic hydrocarbons, and chloropropanols, which form through complex chemical reactions between natural food precursors like amino acids and reducing sugars.

50. (A) Both A and R are true and R is the correct explanation of A.
Polycyclic Aromatic Hydrocarbons are toxic chemical compounds classified as process-induced food contaminants. They are generated during high-temperature thermal processes, especially when grilling or smoking meat. When fat and juices drip from the meat directly onto hot coals, incomplete combustion occurs, producing smoke containing volatile hydrocarbons that rises and coats the surface of the food.

51. (D) Phytic acid, found in whole grains, acts as an extremely potent neurotoxin.
Phytic acid is an organic acid found in whole grains, legumes, and seeds that functions as an antinutrient by chelating essential minerals like iron and zinc, thereby reducing their absorption. It is not a potent neurotoxin. In contrast, cyanogenic glycosides, tetrodotoxin, and hemagglutinins are highly toxic compounds that can cause severe illness if consumed in active forms.

52. (A) P-IV, Q-II, R-I, S-III
Toxins are classified according to their origin. Acrylamide is a process-induced toxin formed during high-temperature baking or frying. Tetrodotoxin is a lethal marine toxin found in pufferfish, while aflatoxins are secondary metabolites produced by Aspergillus fungi. Solanine is a natural glycoalkaloid plant toxin that accumulates in green potatoes exposed to light.

53. (B) Headspace gas chromatography-mass spectrometry.
Furan is a highly volatile, process-induced organic toxin formed during the thermal roasting of coffee beans. Because of its volatile nature, headspace gas chromatography-mass spectrometry is the most appropriate analytical technique for its detection. This method samples the gas phase above the sealed coffee specimen, separating and identifying the compound with high sensitivity and specificity.

54. (A) 2, 4, 1, 3
Analyzing trace food contaminants using high-performance liquid chromatography begins with extracting the target compounds with an appropriate solvent. This is followed by a cleanup step, such as solid-phase extraction, to remove matrix interferences. The purified sample is then injected into the column for chromatographic separation, and finally quantified as it passes through a highly sensitive detector.

55. (A) Pyrrolizidine alkaloid
Pyrrolizidine alkaloids are naturally occurring toxins synthesized by plants, particularly weeds belonging to the Asteraceae and Boraginaceae families, which can contaminate agricultural crops during harvest. They are not produced by microorganisms. In contrast, staphylococcal enterotoxins, patulin, and Shiga toxins are classical microbial toxins synthesized by bacteria or fungi contaminating food products.

56. (C) Statement I is true but Statement II is false.
Acrylamide forms primarily through the Maillard reaction at temperatures above 120 degrees Celsius, when the amino acid asparagine reacts with reducing sugars. This reaction occurs during dry, high-temperature cooking methods like baking, frying, and roasting. Boiling foods in water does not exceed 100 degrees Celsius and does not promote acrylamide formation, making the second statement false.

57. (D) Solanine
Potatoes stored in the presence of light undergo greening, which correlates with the synthesis of chlorophyll and the accumulation of toxic glycoalkaloids, primarily solanine. Solanine is a natural plant toxin that inhibits cholinesterase enzymes and disrupts cell membranes. Ingestion of high levels causes gastrointestinal distress,

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neurological symptoms like headaches, confusion, and in severe cases, death.

58. (C) Enzyme-linked immunosorbent lateral flow test kits.
Rapid, on-site field screening of grain shipments for mycotoxins requires user-friendly, portable testing methods. Lateral flow test kits utilizing enzyme-linked immunosorbent assays are ideal for this application. These immunochromatographic strips provide rapid qualitative or semi-quantitative results within minutes at the port of entry, bypassing the need for complex laboratory instrumentation like mass spectrometry during initial screening.

59. (B) Gossypol – Cottonseed
Gossypol is a toxic polyphenolic pigment naturally found in the seeds of the cotton plant, acting as a defense mechanism against pests. Other pairings are incorrect: patulin is a fungal toxin associated with moldy apples rather than pufferfish, saxitoxin is a marine algal toxin, and amygdalin is a cyanogenic glycoside found in apricot kernels rather than peanuts.

60. (D) Cause: High-temperature cooking of meats; Effect: Amino acids and creatine react to form HCAs.
Heterocyclic amines are mutagenic and carcinogenic compounds formed during high-temperature cooking of protein-rich foods, such as pan-frying or grilling meat. Under high temperatures, free amino acids, creatine, and creatinine present in muscle tissue undergo complex chemical pyrolytic reactions. This directly leads to the synthesis of heterocyclic amines, which accumulate on the cooked surface of the meat.

61. (A) Aspergillus flavus and Aspergillus parasiticus
Aflatoxins are highly toxic, carcinogenic mycotoxins primarily produced as secondary metabolites by the saprophytic molds Aspergillus flavus and Aspergillus parasiticus. These fungi readily colonize agricultural commodities such as maize, groundnuts, tree nuts, and cottonseed. Contamination can occur in the field or during storage under warm, humid conditions that favor fungal growth and toxin synthesis.

62. (C) Mycotoxins are mold-produced secondary metabolites contaminating crops pre- or post-harvest.
Mycotoxins are toxic secondary metabolites naturally produced by filamentous fungi, or molds, which can contaminate food crops both pre-harvest in the field and post-harvest during storage. These compounds are highly chemically stable and resist standard thermal processing like boiling. They are not marine-derived nor are they bacterial toxins, posing a significant risk to the agricultural supply chain.

63. (A) 1, 2, and 4
Enzyme-linked immunosorbent assays provide rapid screening for mycotoxins using antigen-antibody interactions, while chromatography with fluorescence offers highly sensitive quantification of aflatoxins. Thin-layer chromatography utilizes the natural fluorescence of aflatoxins under ultraviolet light for identification. However, immunoaffinity columns are highly effective, rather than ineffective, for cleaning up extracts before liquid chromatography, making statement three false.

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64. (D) A device containing specific antibodies on a solid support to isolate and concentrate mycotoxins.
An immunoaffinity column is a specialized sample preparation device utilized in food analysis to clean up and concentrate target compounds. It contains monoclonal or polyclonal antibodies chemically bonded to a solid support matrix inside a small column. When a sample extract passes through, the antibodies selectively bind the target mycotoxins, allowing impurities to be washed away completely.

65. (A) Both A and R are true and R is the correct explanation of A.
Aflatoxin M1 is a toxic metabolite monitored in milk and dairy products to ensure consumer safety. When lactating dairy animals consume feed contaminated with Aflatoxin B1, the toxin is absorbed and metabolized in the liver via cytochrome enzymes into its hydroxylated form, Aflatoxin M1. This compound is then excreted in the milk, posing a direct dietary hazard.

66. (C) TLC offers superior quantitative precision and lower limits of detection than LC-MS/MS.
Thin-layer chromatography is an effective and inexpensive qualitative screening technique,

but it does not offer superior quantitative precision or lower detection limits than liquid chromatography-tandem mass spectrometry. Mass spectrometry provides unmatched sensitivity and accurate mass detection at trace levels. In thin-layer chromatography, identification relies on comparing retention factors and observing natural fluorescence under ultraviolet light.

67. (D) P-I, Q-II, R-IV, S-III
Mycotoxins target different organ systems in humans and animals. Aflatoxin B1 is a potent hepatocarcinogen targeting the liver. Ochratoxin A is nephrotoxic, causing severe kidney damage. Ergot alkaloids act on the central nervous and vascular systems, causing ergotism. Zearalenone exhibits a chemical structure similar to estrogen, causing severe reproductive disorders due to its estrogenic activity.

68. (A) Passing the extract through an IAC to selectively bind and elute the target aflatoxins.
Spices possess highly complex organic matrices containing lipids, pigments, and essential oils that create baseline noise and interfere with chromatography. To prevent this, passing the crude extract through an immunoaffinity column is recommended. The column selectively binds aflatoxins while other compounds are washed away, allowing pure aflatoxins to be eluted for precise, interference-free quantification.

69. (A) 2, 1, 3, 4
The procedure for analyzing aflatoxins using immunoaffinity columns begins by loading the filtered sample extract onto the column. Next, the column is washed with water or buffer to remove unbound matrix impurities. The specifically bound aflatoxins are then eluted using a polar organic solvent like methanol, and this purified eluate is injected into the liquid chromatography system.

70. (B) Fumonisin B1
Fumonisin B1 is a mycotoxin produced by Fusarium species, particularly Fusarium verticillioides, and is structurally distinct from aflatoxins. It is characterized by a long aminopentol chain. Conversely, Aflatoxins B1, G1, and M2 are difuranocoumarin derivatives produced by Aspergillus species, share a similar core ring structure, and are classified under the aflatoxin family of toxins.

71. (A) Both Statement I and Statement II are true.
Aflatoxins possess a conjugated ring system that exhibits natural fluorescence, allowing detection using a fluorescence detector coupled with liquid chromatography. However, the fluorescence of Aflatoxins B1 and G1 is quenched in aqueous mobile phases. Derivatization using iodine, trifluoroacetic acid, or an electrochemical Kobra cell is necessary to enhance their fluorescent signal and improve detection limits.

72. (C) Proliferation of Aspergillus species leading to significant Aflatoxin B1 contamination.
Storing groundnuts at elevated temperatures and high relative humidity above eighty-five percent promotes the rapid growth of Aspergillus flavus and Aspergillus parasiticus molds. These fungi metabolize nutrients in the groundnuts, producing highly toxic and carcinogenic Aflatoxin B1. This environmental condition presents an immediate food safety risk, far exceeding aesthetic rancidity or the formation of other toxins.

73. (D) Employing HPLC with a fluorescence detector after rigorous immunoaffinity column cleanup.
Quantifying Aflatoxin B1 in cereals at trace concentrations like two parts per billion requires highly sensitive analytical techniques. Using high-performance liquid chromatography with a fluorescence detector, following sample cleanup with an immunoaffinity column, is the most suitable method. The column isolates the aflatoxins, while fluorescence detection provides the sensitivity and low detection limits required to meet safety standards.

74. (C) Patulin – Apple juice
Patulin is a mycotoxin produced by Penicillium, Aspergillus, and Byssochlamys species, commonly associated with moldy apples and processed apple juice. Other pairings are incorrect: Aflatoxin M1 is found in milk rather than groundnuts, deoxynivalenol is a trichothecene mycotoxin found in cereal grains rather than milk, and zearalenone is associated with corn rather than dried figs.

75. (B) Cause: Cereal exposure to high humidity and warmth; Effect: Mold growth and mycotoxin synthesis.
The primary cause of mycotoxin contamination in agricultural crops is the exposure of cereals to high humidity and warm temperatures during growth, harvest, or storage. These conditions facilitate the germination of fungal spores, leading to mold

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proliferation. As a consequence of their metabolic activity, the molds synthesize toxic secondary metabolites, contaminating the grain supply and posing safety risks.

76. (D) Histamine
Histamine is the primary biogenic amine responsible for scombroid poisoning in spoiled fish. When scombroid fish species, such as tuna or mackerel, are stored under inadequate refrigeration, specific bacteria proliferate and convert the natural amino acid histidine into histamine through decarboxylation. Consuming this contaminated fish triggers a toxic reaction that mimics a severe allergic response.

77. (A) High levels of tyramine in aged cheeses can cause hypertensive crises in patients taking MAOIs.
Tyramine is a biogenic amine found in aged cheeses and fermented foods. Ingesting high levels can cause hypertensive crises, known as the cheese effect, in patients taking monoamine oxidase inhibitors, as these drugs block the enzyme that degrades tyramine. Biogenic amines are formed by bacterial decarboxylation of amino acids, and histamine cannot be destroyed by cooking.

78. (C) 1, 2, and 4
Biogenic amines are typically analyzed using liquid chromatography with UV or fluorescence detection. Because many amines lack chromophores, chemical derivatization with reagents like dansyl chloride is often required to facilitate detection. Tandem mass spectrometry offers high sensitivity and specificity for profiling amines without mandatory derivatization. Measuring pH alone is not a reliable quantitative method.

79. (A) A low-molecular-weight organic base formed mainly by decarboxylation of specific amino acids.
A biogenic amine is a low-molecular-weight organic nitrogenous compound formed primarily by the enzymatic decarboxylation of free amino acids by microorganisms. Common examples include histamine, tyramine, putrescine, and cadaverine. These compounds are frequently found in fermented, aged, or spoiled foods and serve as chemical indicators of microbiological activity, food decomposition, and general hygienic quality.

80. (A) Both A and R are true and R is the correct explanation of A.
Scombroid poisoning is a foodborne illness that clinically resembles a severe allergic reaction but is toxicological in nature. It is caused by consuming fish containing high levels of pre-formed histamine, which directly binds and triggers physiological histamine receptors in the body. This occurs without involving IgE antibodies or the immune system, explaining the allergic-like symptoms.

81. (B) The presence of hormonal residues in meat poses no theoretical risk to human health, hence regulatory limits do not exist.
The presence of veterinary hormone residues in meat poses significant potential risks to human health, including endocrine disruption and developmental issues, which is why regulatory authorities establish strict maximum residue limits. Sub-therapeutic antibiotic residues also contribute to antimicrobial resistance and can inhibit active starter cultures during industrial fermentation, making monitoring essential for dairy and meat safety.

82. (C) P-III, Q-I, R-IV, S-II
Biogenic amines are formed by the enzymatic decarboxylation of specific precursor amino acids by bacteria. Histamine is synthesized from histidine, while tyramine is produced from tyrosine. Cadaverine is formed through the decarboxylation of lysine, and putrescine is generated from ornithine or arginine, serving as key chemical indicators of bacterial activity in spoiled foods.

83. (D) Rapidly chilling fish below 4°C after catch to inhibit bacterial histidine decarboxylase activity.
To prevent the accumulation of toxic histamine in harvested tuna, rapidly chilling the fish below four degrees Celsius immediately after catch is critical. This rapid temperature reduction inhibits the growth of mesophilic bacteria and halts the activity of their histidine decarboxylase enzymes. This prevention step stops the conversion of histidine into histamine, ensuring the fish remains safe.

84. (A) Melamine in dairy – Refractometry
Refractometry measures the refractive index of liquids and is not a specific or sensitive method for detecting melamine in dairy products. Melamine is analyzed using advanced techniques like liquid chromatography-tandem mass spectrometry or

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ELISA. Other pairs are correct, including using microbial inhibition assays for antibiotics, liquid chromatography for hormones, and derivatization for biogenic amines.

85. (B) Aspartame
Aspartame is a synthetic dipeptide methyl ester utilized as a low-calorie artificial sweetener in foods and beverages. It is not a biogenic amine. In contrast, spermidine, putrescine, and cadaverine are classic biogenic amines, which are nitrogenous compounds formed through the decarboxylation of amino acids during natural fermentation or the bacterial decomposition of organic matter.

86. (C) Statement I is true but Statement II is false.
The primary public health concern with chronic exposure to low levels of antibiotic residues is the development of antimicrobial resistance in the human microbiome. However, boiling milk for five minutes does not completely degrade all classes of veterinary antibiotics, as many, such as sulfonamides and beta-lactams, exhibit significant thermal stability, making the second statement false.

87. (A) Condemn the product due to zero-tolerance policies linked to aplastic anemia risks.
Chloramphenicol is a potent broad-spectrum antibiotic banned in food-producing animals due to its association with dose-independent aplastic anemia in humans. Consequently, regulatory agencies enforce a zero-tolerance policy for its residues in aquaculture. Upon analytical confirmation of its presence, the contaminated batch must be condemned and destroyed, as thermal processing or washing cannot render it safe.

88. (C) Employing high-precision LC-MS/MS assays for ultimate sensitivity and confirmatory verification.
Detecting and quantifying trace levels of synthetic growth hormones in complex meat matrices requires analytical methods with high sensitivity and specificity. Liquid chromatography-tandem mass spectrometry is the recommended method for this purpose. This technique separates compounds in the liquid phase and identifies them by their mass-to-charge ratios, enabling accurate confirmation of hormones at parts-per-trillion levels.

89. (D) Oxytetracycline – Antibiotic
Oxytetracycline is a broad-spectrum tetracycline antibiotic widely used to treat bacterial infections in livestock and aquaculture. Other pairings are incorrect: clenbuterol is a beta-agonist bronchodilator rather than a coloring agent, recombinant bovine somatotropin is a growth hormone rather than an anthelmintic, and ivermectin is an antiparasitic drug rather than a steroid hormone.

90. (C) Cause: Bacterial decarboxylation of ornithine; Effect: Synthesis of putrescine and foul odors.
Putrescine is a biogenic amine formed during the decomposition of meat. The primary mechanism involves the bacterial decarboxylation of the amino acid ornithine, catalyzed by bacterial enzymes. This metabolic process leads to the synthesis of putrescine, which contributes to the foul odors associated with meat spoilage, serving as a key chemical indicator of microbial contamination.

91. (B) Azo dyes
Sudan dyes belong to the chemical class of synthetic azo dyes, characterized by the presence of one or more azo groups linking aromatic rings. These dyes are highly lipophilic, making them soluble in fats and oils, and are industrially used for coloring plastics, waxes, and solvents. Their carcinogenic properties have led to a global ban on their use in food.

92. (D) It is a banned synthetic dye used in turmeric powder that causes systemic toxicity.
Metanil yellow is a synthetic acid-base indicator dye that is strictly banned in food products globally. It is frequently used illegally to adulterate turmeric powder or gram flour to impart a bright yellow color. Consumption of this dye is associated with systemic toxicity, including neurotoxicity and hepatocellular damage, making it a major food safety hazard.

93. (A) 1, 2, and 4
Rhodamine B is an unpermitted fluorescent dye used to color sweets, while Sudan dyes are lipophilic industrial colorants. Ingesting synthetic azo dyes like Sudan I is associated with carcinogenic and genotoxic risks. However, malachite green is a toxic dye banned in food production, meaning its application to green vegetables is illegal and unsafe, making statement three false.

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94. (C) It is rich in nitrogen (~66%), falsely inflating protein readings in standard nitrogen assays.
Melamine is an organic nitrogen-rich compound containing approximately sixty-six percent nitrogen by mass. This chemical characteristic led to its illegal use as an adulterant in food and animal feed. Traditional protein determination methods, such as the Kjeldahl or Dumas assays, measure total nitrogen to estimate protein content, allowing melamine to falsely inflate protein readings.

95. (A) Both A and R are true and R is the correct explanation of A.
The Kjeldahl method is unable to distinguish between genuine milk protein and melamine. This analytical limitation exists because the method relies on acid digestion to convert organic nitrogen into ammonium ions, measuring total nitrogen content. Consequently, it counts nitrogen from any source, including non-protein compounds like melamine, allowing it to falsely inflate calculated protein values.

96. (D) The maximum permitted level for Sudan I in chilli powder is 5 ppm according to Codex Alimentarius.
Sudan I is classified as a genotoxic carcinogen by international food safety bodies, leading to a zero-tolerance policy in food products. Consequently, there is no maximum permitted level for Sudan I in chilli powder, making any detection of this dye illegal. Regulatory labs utilize highly sensitive methods like LC-MS/MS to identify trace contamination.

97. (B) P-II, Q-III, R-I, S-IV
Banned synthetic dyes are used illegally to color specific food products. Metanil yellow is added to turmeric or gram flour. Sudan Red is used to color lipophilic products like palm oil or paprika. Rhodamine B is a pink dye used in sweets, and malachite green is applied to green vegetables like peas to maintain color.

98. (C) Organic solvents like hexane or acetonitrile.
Sudan dyes are highly lipophilic, synthetic azo dyes that do not dissolve in water or acidic solutions. To isolate them from food matrices like chilli powder for thin-layer chromatography, organic solvents such as hexane, acetonitrile, or acetone are required. These solvents dissolve the lipophilic dyes, allowing for efficient extraction and separation from other matrix compounds.

99. (D) Melamine in milk – Addition of iodine solution yields a deep blue color.
Adding iodine solution to milk is a specific test for starch, yielding a deep blue-black color, and is not used to detect melamine. Melamine is detected using high-performance liquid chromatography or ELISA. Other pairs are correct, including detecting metanil yellow with acid, identifying rhodamine B via fluorescence, and malachite green through paper stains.

100. (A) Tartrazine
Tartrazine is a synthetic lemon yellow azo dye that is permitted for use in food products, provided it is used within established maximum permitted levels. In contrast, Sudan III, metanil yellow, and Orange II are strictly non-permitted dyes banned globally due to their toxicity, carcinogenicity, and genotoxicity, making their presence in food illegal.

101. (D) Statement I is false but Statement II is true.
Melamine alone exhibits relatively low acute oral toxicity and does not rapidly destroy liver cells. However, its severe renal toxicity is caused by co-precipitation with its structural analogue, cyanuric acid, in the kidneys. This interaction forms insoluble melamine-cyanurate crystals that block renal tubules, leading to crystal nephropathy, kidney stones, and acute renal failure, making the second statement true.

102. (B) A Sudan dye
The detection of an uncharacterized lipophilic peak in a red paprika extract indicates the presence of a fat-soluble synthetic colorant, most likely a Sudan dye. Sudan dyes are lipophilic azo colorants used illegally to enhance the red color of spices. They are structurally distinct from natural hydrophilic pigments like anthocyanins or permitted food dyes like carmine.

103. (A) Liquid Chromatography-Tandem Mass Spectrometry (LC-MS/MS).
Liquid chromatography-tandem mass spectrometry is the gold standard method for the confirmatory identification and quantification of melamine in complex dairy matrices. This technique separates melamine from matrix components and identifies it based on parent-to-product ion transitions. This approach provides high sensitivity and specificity, preventing false positives from non-protein nitrogen or other compounds.

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CHAPTER 25

Food Safety Management: HACCP, GMP, GLP, GAP, GHP and Traceability

1. The concept of the Hazard Analysis and Critical Control Point (HACCP) system was originally developed in the 1960s to ensure food safety for which of the following specific programs?
(A) The United States military ration program
(B) The NASA manned space program
(C) The World Health Organization global food initiative
(D) The Codex Alimentarius international trade standard

2. Read the following statements regarding Prerequisite Programmes (PRPs) and HACCP and select the correct option:
Statement I: Prerequisite Programmes focus exclusively on identifying specific chemical hazards within the manufacturing process.
Statement II: Prerequisite Programmes must be established and fully operational before a HACCP plan can be effectively implemented.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

3. Consider the following statements regarding the history and principles of HACCP:
1. HACCP was jointly developed by the Pillsbury Company, NASA, and the U.S. Army Natick Research Laboratories.
2. The National Advisory Committee on Microbiological Criteria for Foods (NACMCF) formalized the seven principles of HACCP.
3. HACCP was originally designed as a reactive quality control system based on end-product testing.
4. Codex Alimentarius adopted HACCP guidelines to standardize international food safety management.

Which of the above statement(s) is/are correct?
(A) 1, 2, and 4 only
(B) 2, 3, and 4 only
(C) 1 and 3 only
(D) 1, 2, 3, and 4

4. Which of the following statements correctly describes the fundamental objective of a Food Safety Management System (FSMS)?
(A) It is designed to replace external regulatory inspections with internal corporate quality audits.
(B) It aims to eliminate all biological hazards by relying solely on terminal sterilization methods.
(C) It integrates programs to prevent, eliminate, or reduce safety hazards to acceptable levels.
(D) It prioritizes physical quality attributes like color and texture over microbiological safety.

5. A food processing facility frequently experiences airborne contamination in its packaging area due to an improper ventilation system. The management decides to implement a HACCP plan to solve this issue. Why is this approach fundamentally flawed?
(A) Ventilation and facility air quality should be managed through Prerequisite Programmes (PRPs) prior to HACCP implementation.
(B) HACCP plans do not address airborne biological contaminants.
(C) Airborne contamination is considered a quality defect, not a food safety hazard.
(D) The ventilation system should be designated as the sole Critical Control Point (CCP) without needing a full HACCP plan.

6. Match the food safety management programs in List I with their primary scopes in List II and select the correct option:
List I: (Programs)
P. Good Agricultural Practices (GAP)

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the isolated bone. Ionizing radiation generates stable free radicals in the hydroxyapatite crystalline structure of bones. These radicals remain trapped for long periods and can be identified and quantified using EPR, providing definitive confirmation of irradiation.

114. (C) Cold sterilization – A process that relies exclusively on freezing food to absolute zero to destroy all microbes.
Cold sterilization in food processing refers to the application of non-thermal preservation technologies, such as ionizing radiation, to sterilize food without heating. It does not involve freezing food to absolute zero. Other terms are correct: the Radura is the international irradiation symbol, the Gray is the unit of absorbed dose, and Cobalt-60 is a gamma source.

115. (D) Highly refined vegetable oil.
The DNA comet assay requires intact cellular material with structured DNA to evaluate fragmentation. Highly refined vegetable oil is a lipid matrix that has undergone processing to remove proteins, water, and cellular components, leaving it devoid of intact cells or DNA. Consequently, it is completely unsuitable for analysis using this cellular electrophoresis method.

116. (C) Statement I is false but Statement II is true.
While regulatory frameworks require irradiated foods to be labeled, they do not universally mandate the Radura symbol, as requirements vary by country. However, food safety laws consistently require clear descriptive text on the label, such as "Treated with radiation" or "Treated by irradiation," to ensure consumer awareness, making the first statement false and the second true.

117. (B) Perform a confirmatory thermoluminescence test on the isolated silicate minerals.
Photostimulated luminescence is a rapid screening tool that can yield false positives. If a sample of herbs screens positive, the next step is to perform a confirmatory thermoluminescence test on the isolated silicate minerals adhering to the leaves. Thermoluminescence is a highly reliable reference method that confirms the irradiation history of the herbs.

118. (B) Isolating the silicate minerals and applying Thermoluminescence.
To differentiate between irradiated and non-irradiated cumin seeds containing soil dust, isolating the silicate minerals and applying thermoluminescence is the most definitive method. Crystalline silicate minerals absorb ionizing radiation, which traps electrons in their lattice. Heating these isolated minerals releases the trapped energy as measurable light, providing confirmation of the irradiation process.

119. (A) Sprout inhibition (e.g., potatoes) – Low dose (up to 0.15 kGy)
Sprout inhibition in tubers like potatoes requires low doses of ionizing radiation, typically up to 0.15 kilograys. Other applications are paired incorrectly: commercial sterilization of meat requires high doses above ten kilograys rather than low doses, ripening delay is achieved with low-to-medium doses, and pathogen reduction in spices requires high doses up to ten kilograys.

120. (C) Cause: Ionizing radiation exposure; Effect: DNA strand breaks allow outward migration during electrophoresis.
The cause-and-effect relationship evaluated in the DNA comet assay relies on DNA fragmentation. Exposing a food product to ionizing radiation induces double-stranded and single-stranded breaks in the cellular DNA. During single-cell gel electrophoresis, these smaller, fragmented DNA pieces migrate out of the cell nucleus toward the anode, forming a visible comet-like tail.

121. (D) Naturally occurring primordial radionuclides such as Potassium-40 and Carbon-14.
Natural background radioactivity in food and living organisms originates primarily from primordial radionuclides present since the formation of the earth, such as Potassium-40, Carbon-14, and members of the uranium decay series. These isotopes are absorbed by plants and animals through soil and air, distributing naturally within food products without human intervention.

122. (C) It has a 30-year physical half-life and mimics potassium, distributes throughout soft tissues.
Cesium-137 is an artificial radionuclide with a physical half-life of thirty years, making it a long-term environmental and food safety concern. Chemically, cesium mimics potassium, allowing it to be easily absorbed by organisms and

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distributed throughout soft tissues. It undergoes beta decay and emits high-energy gamma photons, facilitating detection by gamma spectrometry.

123. (B) 1, 2, and 4
Strontium-90 mimics calcium and accumulates in bones, while Iodine-131 concentrates in the thyroid. The biological half-life, representing metabolic excretion, differs from the physical radioactive half-life. Cesium-137 is a beta and gamma emitter rather than an exclusive alpha emitter, making gamma spectrometry a primary method for its detection, which makes statement three incorrect.

124. (D) One radioactive decay event (disintegration) per second.
In food radioactivity analysis, the Becquerel is the standard international unit of activity. It is defined as the activity of a quantity of radioactive material in which one nucleus decays per second. This unit measures the rate of spontaneous nuclear disintegration, providing a quantitative value for radionuclide concentration when expressed per kilogram of food.

125. (A) Both A and R are true and R is the correct explanation of A.
Following a nuclear accident, authorities often ban the consumption of fresh milk from the affected area. Dairy cows grazing on pasture rapidly ingest deposited radioactive fallout containing Iodine-131. This isotope is quickly absorbed and secreted into their milk. Consuming this milk poses a thyroid exposure risk, as the human thyroid concentrates iodine.

126. (C) Foods exceeding these guideline levels are legally permitted for sale if boiled prior to consumption.
Foods exceeding regulatory guideline levels for radionuclides are deemed unfit for human consumption and cannot be legally sold. Thermal processing like boiling does not affect the physical half-life of radionuclides or eliminate them from the food matrix. In contrast, guideline levels are expressed in Becquerels per kilogram and are set stricter for infant food.

127. (A) P-III, Q-I, R-II, S-IV
Radionuclides exhibit distinct biological behaviors. Iodine-131 concentrates in the thyroid gland. Strontium-90 mimics calcium, accumulating in bone tissue. Cesium-137 behaves like potassium, distributing throughout soft muscle tissues. Potassium-40 is a natural radionuclide present in living tissues, with its levels homeostatically controlled by the body, making it a constant component of background radiation.

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128. (D) Iodine-131
In the immediate days following a nuclear fallout event, milk from pasture-fed cows in the affected area must be tested for Iodine-131. This volatile fission product is deposited on pasture grass, ingested by grazing cattle, and rapidly excreted in milk. Because it has a short physical half-life of eight days, it poses an immediate thyroid risk.

129. (B) Cesium-134 – Half-life of 14 million years
Cesium-134 is an artificial radionuclide with a relatively short physical half-life of approximately two years, rather than fourteen million years. Other pairings are correct: Iodine-131 has an eight-day half-life, Cesium-137 has a thirty-year half-life, and Strontium-90 has a twenty-nine-year half-life, which represent their actual physical decay rates.

130. (C) Radon-222 (^{222}Rn)
Radon-222 is a naturally occurring radioactive gas generated by the radioactive decay of radium in the earth's crust. It is not an artificial radionuclide produced by nuclear fission or reactor accidents. In contrast, Cesium-137, Strontium-90, and Iodine-131 are artificial fission products released during nuclear accidents that contaminate the food supply.

131. (C) Statement I is true but Statement II is false.
Gamma spectrometry using high-purity germanium detectors can simultaneously identify and quantify multiple gamma-emitting radionuclides in a sample. However, unlike alpha or beta emitters, gamma spectrometry is non-destructive and typically does not require extensive chemical extraction or digestion, allowing direct measurement of food in standardized geometries, making the second statement false.

132. (A) Broad-leafed vegetables due to direct surface deposition.
In the immediate aftermath of a nuclear accident, broad-leafed vegetables present the highest risk of direct contamination. Their large surface area directly catches falling radioactive dust. In contrast, underground tubers and greenhouse crops are protected from direct atmospheric

deposition, while fruit trees receive less direct exposure relative to their surface area during the initial fallout phase.

133. (B) Ashing and radiochemical separation followed by beta counting on a proportional counter.
Strontium-90 is a pure beta emitter that does not release gamma photons, meaning it cannot be detected by non-destructive gamma spectrometry. Quantifying this isotope requires dry ashing of the food sample to remove organic matter, followed by radiochemical separation to isolate strontium. The purified strontium is then measured using beta counting on a proportional counter.

134. (B) Gamma Spectrometer – Quantification of specific gamma-emitters like Cesium-137.
A gamma spectrometer is the primary instrument used to identify and quantify specific gamma-emitting radionuclides in food, such as Cesium-137. Other pairings are incorrect: GM counters are used for rough contamination screening rather than energy identification, liquid scintillation counters measure low-energy beta activity, and UV spectrophotometers measure chemical absorbance rather than radioactivity.

135. (A) Cause: Ingestion of ^{90}Sr; Effect: It replaces calcium in bone, raising leukemia and bone cancer risks.
Ingestion of food contaminated with Strontium-90 presents significant health risks. Strontium-90 shares chemical properties with calcium, allowing the body to absorb and deposit it in bone tissue and teeth. The continuous emission of beta particles from the deposited radionuclide damages surrounding bone marrow cells, increasing the risk of leukemia and bone cancer over time.

136. (C) It relies on gas ionization in a tube by radiation, creating a measurable electrical pulse.
A Geiger-Müller counter is a radiation screening instrument that relies on gas ionization. The detector consists of a gas-filled tube with an applied voltage. When ionizing radiation enters the tube, it collides with gas molecules, creating ion pairs. This triggers an avalanche of charge that produces a measurable electrical pulse, indicating the presence of radioactivity.

137. (D) It is a non-destructive method identifying radionuclides by the unique energy peaks of gamma photons.
Gamma spectrometry is a non-destructive analytical method used to identify and quantify radionuclides in food. It measures the unique energy peaks of gamma photons emitted by radionuclides during decay. This allows for simultaneous identification of multiple gamma-emitting isotopes like Cesium-137 and Iodine-131 in a single sample run without requiring chemical destruction of the food matrix.

138. (C) 1, 2, and 3
International guideline levels apply to food traded after nuclear emergencies. These guidelines group radionuclides by their radiotoxicity to protect public health. Exceeding these levels renders food unfit for sale. However, washing or peeling fruits cannot eliminate internal radioactivity absorbed through the roots, which makes the fourth statement incorrect in food safety management.

139. (B) Protective actions like food embargoes or sheltering implemented to restrict public exposure after an emergency.
Emergency response interventions are protective actions implemented immediately after a nuclear event to minimize public exposure to radionuclides. These actions include placing food embargoes, sheltering livestock, securing clean animal feed, and monitoring agricultural zones. These interventions prevent contaminated food from entering the supply chain, ensuring public safety during the early and intermediate post-accident phases.

140. (A) Both A and R are true and R is the correct explanation of A.
In the days following a radiological fallout event, washing and peeling root vegetables can reduce their contamination. During the early phase, radioactive dust is deposited from the atmosphere onto the exterior surfaces of plants and soil. Peeling and washing physically remove this superficial contamination before the isotopes can be absorbed by the roots, protecting consumers.

141. (A) Boiling or cooking food heavily reduces the physical half-life of Cesium-137 from 30 years down to a few days.
The physical half-life of a radionuclide is a constant determined by nuclear physics and cannot be altered by chemical processing or

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cooking. Boiling food does not affect the decay rate of Cesium-137. In contrast, the biological half-life represents metabolic excretion, and the effective half-life combines both physical decay and biological elimination rates.

142. (C) P-III, Q-IV, R-I, S-II
Emergency response phases involve specific agricultural actions. The early phase focuses on securing clean water and animal feed. The intermediate phase involves environmental sampling and dietary monitoring. Food embargoes restrict the movement and sale of contaminated food, while remediation involves long-term strategies like deep plowing of contaminated soil to reduce plant absorption.

143. (A) No, because washing does not guarantee removal of internal or superficial contamination.
Washing crop plants with bleach does not guarantee the removal of superficial radioactive dust, nor can it remove internal contamination absorbed through the root system. Bleach cannot chemically neutralize radioactive isotopes. Once an embargo is placed due to contamination exceeding safe limits, the crop must be held or destroyed according to radioprotection guidelines.

144. (D) Physical half-life – Time required for the body to excrete half of an ingested isotope.
Physical half-life is the time required for half of the atoms in a radioactive sample to decay, which is a constant nuclear property. The time required for the body to excrete half of an ingested isotope is the biological half-life. Other pairs are correct: the Becquerel measures disintegrations, the Sievert measures biological dose, and gamma rays are highly penetrating.

145. (B) Boiling the milk vigorously for 10 minutes to instantly destroy the radioactivity before giving it to infants.
Boiling milk vigorously does not affect the physical half-life of radioactive isotopes or destroy radioactivity. Consequently, boiling cannot render contaminated milk safe, making this an unacceptable mitigation strategy. In contrast, processing milk into aged cheeses allows short-lived Iodine-131 to decay naturally over several half-lives, while diverting milk to non-food use prevents dietary exposure.

146. (C) Statement I is false but Statement II is true.
Guideline levels for radionuclides in food apply to commodities traded internationally after a nuclear emergency, rather than normal, non-emergency circumstances, making the first statement false. However, the guideline level for infant foods is set at a stricter threshold due to the higher sensitivity of infants to ionizing radiation, making the second statement true.

147. (D) Detain the shipment and send samples for HPGe gamma spectrometry to quantify specific isotopes.
Handheld Geiger-Müller counters are screening instruments that detect total ionizing events but cannot identify specific radionuclides. If a screening triggers an alarm, the shipment must be detained, and samples sent for high-purity germanium gamma spectrometry. This laboratory method identifies the specific isotopes present and quantifies their activity to determine compliance with regulatory safety limits.

148. (A) Employing separate methods: alpha/beta require destructive chemistry, while gamma can be non-destructive.
Differentiating between alpha, beta, and gamma radiation in a contaminated food matrix requires separate analytical methods. Alpha and beta particles have low penetrating power and require chemical extraction and destructive sample preparation prior to liquid scintillation or proportional counting. Conversely, gamma photons have high penetrating power and can be measured non-destructively using gamma spectrometry.

149. (B) ALARA – Implementing strict monitoring to minimize population exposure to dietary radionuclides.
The ALARA principle, meaning "As Low As Reasonably Achievable," is a radioprotection concept applied in food safety to minimize public exposure to dietary radionuclides. It involves implementing monitoring, food embargoes, and agricultural countermeasures to keep radiation exposure far below regulatory limits, considering economic and social factors, rather than referring to physical mass or thermal processing.

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150. (B) Cause: Delaying harvest; Effect: Allows decay of short-lived isotopes, reducing contamination levels.

Delayed harvesting is an effective agricultural countermeasure used after a radiological emergency. By leaving crops unharvested for a period, short-lived radionuclides like Iodine-131 decay naturally over several half-lives. This delay reduces the total radioactivity on the crop before harvest, lowering contamination levels and preventing radioactive isotopes from entering the food supply chain.

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104. (C) Malachite Green – Bright blue-green
Malachite green is a synthetic dye that imparts a bright, intense blue-green color, used illegally to dye green vegetables or treat aquaculture. Other options are incorrect: metanil yellow imparts a bright yellow color rather than pink, Sudan I is an orange-red dye rather than black, and rhodamine B is a fluorescent pink-red dye rather than yellow.

105. (D) Cause: Melamine is rich in nitrogen; Effect: It artificially elevates crude protein readings.
The cause-and-effect relationship of melamine adulteration in dairy products relies on its chemical structure, which contains approximately sixty-six percent nitrogen by mass. Adding melamine to diluted milk increases the total nitrogen content of the sample. This artificially inflates the crude protein readings obtained from nitrogen-based assays like Kjeldahl, masking the water dilution.

106. (C) To significantly reduce pathogens and bacterial spores.
Applying higher doses of ionizing radiation up to ten kilograys to dried spices is a food safety process used to reduce microbial loads. Spices often harbor high levels of environmental pathogens, molds, and bacterial spores. Irradiation disrupts the DNA of these microorganisms, pasteurizing the product without using heat, which preserves volatile essential oils.

107. (B) EPR is mainly used to detect stable free radicals trapped in rigid parts like bone, shell, or seeds.
Electron paramagnetic resonance spectroscopy is an analytical method used to detect irradiated foods by measuring stable free radicals. These radicals are generated by ionizing radiation and become trapped within rigid, crystalline matrices, such as animal bones, seafood shells, or plant seeds. Because these radicals remain stable over long periods, EPR provides a reliable way to confirm irradiation.

108. (D) 1, 2, and 3
Thermoluminescence is based on measuring light emissions from trapped charge carriers when a sample is heated. It is highly effective for analyzing silicate minerals adhering to foods like spices. If these minerals are washed away, the test cannot distinguish irradiated samples. TL does not measure carbon isotopic ratios, which makes the fourth statement completely incorrect.

109. (A) A rapid screening method measuring light from trapped charge carriers stimulated by infrared pulses.
Photostimulated luminescence is a rapid screening method used to detect irradiated foods containing silicate minerals. Ionizing radiation traps charge carriers within the mineral lattice. When stimulated by pulses of infrared light, these carriers are released, emitting visible light. Measuring this light emission allows for rapid identification of irradiated samples without destroying the food matrix.

110. (A) Both A and R are true and R is the correct explanation of A.
The DNA comet assay is a screening method used to identify irradiated foods containing intact cells. Ionizing radiation causes double-stranded and single-stranded DNA breaks. During gel electrophoresis of the isolated cells, these small, fragmented DNA pieces migrate faster toward the anode than intact DNA, forming a characteristic comet-like shape visible under fluorescence microscopy.

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111. (A) Irradiation induces a radioactive state in the food, making it slightly radioactive for several weeks.
Food irradiation utilizes controlled levels of ionizing radiation, which do not have enough energy to induce radioactivity in the food. The processed food never becomes radioactive. In contrast, irradiation is a cold pasteurization technique used to inhibit sprouting, eliminate pathogens, and control insect pests without significantly raising the temperature of the food product.

112. (D) P-IV, Q-I, R-II, S-III
Irradiated foods are identified using different analytical targets. Electron paramagnetic resonance detects stable free radicals in rigid matrices like bones. Thermoluminescence measures trapped charges in silicate minerals adhering to the food. The DNA comet assay evaluates DNA fragmentation, while gas chromatography-mass spectrometry quantifies radiolytic volatile hydrocarbons formed from fat molecules during irradiation.

113. (B) EPR on the extracted bone fragments.
To verify if chicken bone fragments have been subjected to irradiation, electron paramagnetic resonance spectroscopy should be performed on

Q. Good Manufacturing Practices (GMP)
R. Good Hygienic Practices (GHP)
S. Good Laboratory Practices (GLP)
List II: (Scopes)
I. Ensuring the reliability, consistency, and integrity of non-clinical safety test data
II. Implementing basic operational and environmental conditions for safe food production
III. Ensuring safe farming methods, proper pesticide use, and clean agricultural water
IV. Focusing on sanitary conditions, cleaning, and personnel hygiene in food handling
(A) P-III, Q-II, R-IV, S-I
(B) P-II, Q-III, R-I, S-IV
(C) P-III, Q-IV, R-II, S-I
(D) P-IV, Q-II, R-III, S-I

7. Which of the following statements about Prerequisite Programmes (PRPs) is incorrect?
(A) PRPs provide the basic environmental and operating conditions necessary for food production.
(B) Deviations in PRPs always require an immediate recall of the entire production batch.
(C) PRPs are often generalized across the entire food processing facility rather than being step-specific.
(D) Pest control and personnel training are standard components of PRPs.

8. In a dairy plant, management notices that workers are moving directly from raw milk receiving areas to pasteurized product packaging areas without changing boots. Under which FSMS component should this issue be directly addressed and corrected?
(A) Critical limit establishment under standard HACCP Principle 3
(B) Internal traceability and product emergency recall protocols
(C) Personnel hygiene and zoning under Prerequisite Programmes
(D) Farm-level management under Good Agricultural Practices

9. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): HACCP is recognized as a preventive system rather than a reactive one.
Reason (R): HACCP relies heavily on comprehensive end-product testing to ensure no defective products reach the market.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

10. Which of the following pairs of HACCP principles is correctly matched with its description?
(A) Principle 4 - Establishing monitoring procedures for CCPs
(B) Principle 1 - Establishing operational corrective actions
(C) Principle 6 - Establishing validated critical limits
(D) Principle 7 - Conducting a systematic hazard analysis

11. An outbreak of Salmonella is traced back to a food facility. Investigations reveal that while the pasteurization step (a CCP) met all critical limits, the holding tanks were improperly sanitized. This failure illustrates that:
(A) The critical limits established for the pasteurization step were calculated incorrectly.
(B) A failure in foundational Prerequisite Programmes can compromise a valid HACCP plan.
(C) HACCP systems are fundamentally ineffective when managing complex bacterial pathogens.
(D) The facility should have classified holding tank temperatures as environmental hazards.

12. Arrange the following preliminary tasks of HACCP in the correct chronological sequence according to the Codex Alimentarius guidelines:
1. Construct a flow diagram
2. Describe the product
3. Assemble the HACCP team
4. On-site confirmation of the flow diagram
5. Identify the intended use
(A) 3-2-5-1-4
(B) 3-5-2-4-1
(C) 2-3-5-1-4
(D) 1-3-2-5-4

13. Which of the following is NOT typically classified as a Prerequisite Programme (PRP) in a food manufacturing facility?

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(A) Calibration of continuous temperature sensors at a CCP
(B) Supplier approval and raw material ingredient specifications
(C) Waste management and facility drainage disposal systems
(D) Cleaning, sanitation, and chemical disinfection schedules

14. Which of the following best describes the core difference between a Control Point (CP) and a Critical Control Point (CCP)?
(A) A CP completely eliminates a biological hazard, whereas a CCP only reduces it to a standard acceptable level.
(B) Loss of control at a CP causes immediate health risks, whereas loss of control at a CCP only impacts quality.
(C) A CCP is a specific step essential to prevent, eliminate, or reduce a food safety hazard to an acceptable level.
(D) A CP requires continuous tracking with sensors, while a CCP requires only periodic manual visual inspections.

15. Which of the following pairs regarding the origin of food safety frameworks is incorrectly matched?
(A) HACCP - National Advisory Committee on Microbiological Criteria for Foods (NACMCF)
(B) GLP - Organization for Economic Co-operation and Development (OECD)
(C) GAP - Food and Agriculture Organization (FAO)
(D) ISO 22000 - World Trade Organization (WTO)

16. In the context of HACCP, a "hazard" is formally defined as:
(A) Any unexpected procedural deviation that leads to a decline in the sensory quality of the food product.
(B) The mathematical probability that a hazardous contamination event will occur during the process.
(C) A biological, chemical, or physical agent in food with potential to cause adverse health effects.
(D) An intentional contaminant or chemical adulterant introduced to a batch by a disgruntled employee.

17. Read the following statements regarding the HACCP process flow diagram and select the correct option:
Statement I: The flow diagram must be constructed to cover only the steps where Critical Control Points (CCPs) are anticipated.
Statement II: On-site verification of the flow diagram must be performed during all stages and hours of operation to ensure accuracy.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

18. Consider the following statements regarding standard components of HACCP Principle 1 (Hazard Analysis):
1. Identifying potential biological, chemical, and physical hazards is required.
2. Evaluating the severity of the potential adverse health effects is required.
3. Determining the likelihood of occurrence of the hazard is required.
4. Establishing maximum residue limits for all identified hazards is required.

Which of the above statement(s) is/are correct?
(A) 1, 2, and 3 only
(B) 2, 3, and 4 only
(C) 1 and 4 only
(D) 1, 2, 3, and 4

19. Which of the following statements correctly characterizes a CCP decision tree?
(A) It is a logical sequence of questions used to determine if a specific process step is a CCP.
(B) It is a mandatory regulatory requirement used to identify and log all physical quality defects.
(C) It replaces the hazard analysis by directly identifying operational prerequisite program steps.
(D) It is utilized during mock recalls to identify the root cause of systemic product batch failures.

20. During the hazard analysis of a commercial canning process, Clostridium botulinum spores are identified as a significant hazard. The thermal processing (retorting) step is designed

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specifically to destroy these spores. Based on the CCP decision tree, how should this step be classified?
(A) Control Point (CP)
(B) Operational Prerequisite Programme (OPRP)
(C) Critical Control Point (CCP)
(D) Quality Control Point (QCP)

21. Match the hazard categories in List I with their appropriate examples in List II and select the correct option:
List I: (Hazard Categories)
P. Biological Hazard
Q. Chemical Hazard
R. Physical Hazard
S. Radiological Hazard
List II: (Examples)
I. Aflatoxin B_1 in peanuts
II. Glass fragments in a beverage bottle
III. Cesium-137 in harvested mushrooms
IV. Listeria monocytogenes in ready-to-eat deli meats
(A) P-IV, Q-I, R-II, S-III
(B) P-I, Q-IV, R-III, S-II
(C) P-IV, Q-II, R-I, S-III
(D) P-III, Q-I, R-II, S-IV

22. Which of the following statements regarding Critical Control Points (CCPs) is incorrect?
(A) A single CCP can be used to control more than one identified hazard.
(B) Multiple CCPs may be required to adequately control a single hazard.
(C) A CCP is step-specific and depends heavily on the facility's specific layout, equipment, and formulation.
(D) Every step in a food manufacturing process must eventually be designated as a CCP to ensure total safety.

23. A food safety team is analyzing a potential hazard: the presence of a mild allergen that causes slight discomfort, which occurs very rarely due to strict segregated storage. Using a risk assessment matrix, how should this hazard be evaluated for the HACCP plan?
(A) High severity, high likelihood; must be a CCP.
(B) Low severity, low likelihood; may be managed via PRPs rather than a CCP.
(C) High severity, low likelihood; must automatically trigger a mandatory recall.
(D) Low severity, high likelihood; must be designated as a critical limit.

24. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): A metal detector at the end of a packaging line is often designated as a Critical Control Point (CCP).
Reason (R): It is the final step in the process capable of eliminating or reducing a significant physical hazard (metal contamination) to an acceptable level.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

25. Which of the following pairs of hazards and their specific origins is correctly matched?
(A) Patulin - Physical hazard resulting from poor barrier packaging material
(B) Lead contamination - Biological hazard originating from agricultural soil
(C) Wooden splinters - Chemical hazard occurring during pallet degradation
(D) Staphylococcus enterotoxin - Biological hazard from poor human hygiene

26. A HACCP team utilizes an outdated process flow diagram that omits a newly installed bypass valve. What is the most likely immediate consequence of this error on the HACCP system?
(A) A potential hazard pathway is missed during the formal hazard analysis.
(B) The critical limits for subsequent steps will automatically shift upward.
(C) The bypass line will inherently become the primary CCP for the facility.
(D) The facility will immediately lose its official system GLP certification.

27. As a Food Safety Officer auditing a facility, you notice the HACCP team designated the receiving of raw poultry as a CCP for Salmonella. However, the poultry is subsequently fully cooked in a commercial oven (a later step). Based on standard HACCP logic, what should your assessment be?
(A) Receiving is a CCP since poultry inherently carries high levels of Salmonella pathogens.

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verbal confirmation.
(C) The facility will receive a major non-conformance citation for lack of documented control evidence.
(D) The auditor will permanently reclassify the roaster as a standard, non-critical process control point.

57. As an auditor reviewing a facility's HACCP documentation, you observe that the critical limit for cooking chicken is set to 65°C for 10 seconds. The facility states they "chose this temperature to save energy." What competency-based action should you take?
(A) Approve the critical limit immediately since energy conservation is a recommended core component of GMP.
(B) Recommend they lower the pasteurization temperature further to maximize short-term facility profitability.
(C) Accept the verbal explanation of the manager without requiring any formal written backup documentation.
(D) Request scientific validation data proving 65°C for 10 seconds achieves necessary pathogen reduction.

58. Which of the following is an EXCEPTION and would NOT typically be maintained as a formal HACCP record?
(A) The marketing budget for the final food product
(B) Minutes from the HACCP team meetings
(C) Calibration logs for CCP monitoring equipment
(D) The completed CCP decision tree logic for the process steps

59. What is the most appropriate description of the primary goal of Principle 6 (Verification)?
(A) To construct and verify the accuracy of the initial process flow diagram.
(B) To confirm the system operates according to plan and is scientifically sound.
(C) To determine specific disciplinary actions for operators who make manual errors.
(D) To completely eliminate the ongoing need for Good Manufacturing Practices.

60. Which of the following pairs differentiating Validation and Verification is incorrectly matched?
(A) Validation - "Are we doing the right things?"
(B) Validation - Daily review of temperature logs
(C) Verification - "Are we doing things right?"
(D) Verification - Internal auditing of the HACCP system

61. Good Manufacturing Practices (GMP) in the food industry are universally outlined by which international body's general principles of food hygiene?
(A) The Codex Alimentarius Commission
(B) The International Organization ISO
(C) The World Economic Forum coalition
(D) The International Monetary Fund group

62. Read the following statements regarding facility design under Good Manufacturing Practices (GMP) and select the correct option:
Statement I: A facility should be designed to allow a linear product flow from raw materials to finished products to minimize cross-contamination.
Statement II: Drainage systems should ideally flow from highly contaminated raw areas into clean finished product areas to consolidate waste.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

63. Consider the following statements regarding standard personnel hygiene requirements under Good Manufacturing Practices (GMP):
1. Wearing clean protective clothing and hairnets is required.
2. Removing all jewelry and watches before entering the processing area is required.
3. Reporting communicable illnesses to management is required.
4. Allowing eating and smoking only in designated areas outside the production floor is required.

Which of the above statement(s) is/are correct?
(A) 1 and 3 only
(B) 2, 3, and 4 only
(C) 1, 2, and 4 only
(D) 1, 2, 3, and 4

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(C) Critical limits should ideally rely on subjective sensory parameters, such as product taste and smell.
(D) Critical limits must be scientifically based, derived from regulatory standards or research studies.

35. During the continuous pasteurization of milk, the temperature recorder drops to 70°C for 30 seconds. The critical limit is a minimum of 72°C for 15 seconds. What is the immediate required action?
(A) Divert milk flow, segregate the affected product, and adjust heating.
(B) Validate the active HACCP plan to see if 70°C is acceptable.
(C) Continue standard processing but add a warning label to the packaging.
(D) Document the temperature deviation at the shift's end and proceed.

36. Match the HACCP Principle numbers in List I with their corresponding titles in List II and select the correct option:
List I: (HACCP Principle Numbers)
P. Principle 2
Q. Principle 4
R. Principle 5
S. Principle 7
List II: (Titles)
I. Establish monitoring procedures
II. Establish documentation and record-keeping
III. Determine Critical Control Points (CCPs)
IV. Establish corrective actions
(A) P-III, Q-I, R-IV, S-II
(B) P-I, Q-III, R-II, S-IV
(C) P-III, Q-IV, R-I, S-II
(D) P-IV, Q-I, R-III, S-II

37. Which of the following statements about monitoring procedures in HACCP is incorrect?
(A) Monitoring involves complex, multi-day biological tests to verify destruction.
(B) The designated monitoring person must have immediate access to the monitoring equipment.
(C) Records of monitoring must be formally signed by the person conducting the task.
(D) Monitoring assesses if a specific CCP operates within its established critical limits.

38. A food plant uses a dial thermometer to monitor the cooking temperature of a meat product. To ensure accurate monitoring, the thermometer is tested weekly in an ice slurry (0°C) and boiling water (100°C). This activity is an example of:
(A) Performing a detailed process hazard analysis
(B) Setting a scientifically valid critical limit
(C) Executing a mock recall for safety assurance
(D) Performing calibration to support monitoring

39. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): Critical limits should be specific, measurable, and observable parameters such as time, temperature, humidity, or pH.
Reason (R): Measurable parameters allow for rapid or continuous monitoring to ensure process control before the product is distributed.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

40. Which of the following is a correctly matched pair of a monitoring parameter and its appropriate monitoring tool?
(A) Water activity (a_w) - Continuous laboratory water activity meter
(B) Pathogen absence - Automated real-time microbiological incubator
(C) pH level - Standard benchtop pH meter or inline pH probe
(D) Processing time - Digital stopwatch or automated system timer

41. A metal detector is set to reject products containing ferrous metal $\geq 1.5mm$. A test piece of 1.5 mm is passed through the detector, and the machine fails to reject it. What is the direct consequence of this event in a HACCP system?
(A) The established critical limit has been successfully achieved.
(B) The entire facility must immediately shut down operations permanently.
(C) The process hazard analysis must be updated to ignore ferrous metals.
(D) Control is lost at the CCP, triggering mandatory corrective actions.

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42. Arrange the following actions in the standard sequence for handling a HACCP deviation (Corrective Action protocol):
1. Identify and document the deviation.
2. Segregate and hold the non-compliant product.
3. Determine the disposition of the non-compliant product (e.g., rework, destroy).
4. Correct the cause of the deviation to restore process control.

(A) 1-2-4-3
(B) 2-1-3-4
(C) 1-4-2-3
(D) 4-2-1-3

43. Which of the following metrics is an EXCEPTION and typically CANNOT be used as a critical limit at a CCP due to time constraints?
(A) Product core temperature measured by a digital probe
(B) Results of a 48-hour Salmonella culture test
(C) Dwell time on a continuous conveyor belt
(D) Belt speed of a commercial roasting oven

44. What is the most appropriate reason for requiring the individual performing monitoring tasks to sign or initial the monitoring records?
(A) To calculate the employee's hourly wages accurately.
(B) To establish operational accountability and verify that the monitoring occurred on time.
(C) To transfer legal liability from the corporation to the individual employee.
(D) To fulfill the requirements of a third-party financial audit.

45. Which of the following pairs differentiating Corrective Action and Preventive Action is incorrectly matched?
(A) Preventive Action - Releasing product that barely missed the critical limit
(B) Corrective Action - Reactive response to a CCP deviation
(C) Preventive Action - Proactive measure to eliminate the root cause of a potential problem
(D) Corrective Action - Segregating adulterated product

46. In the context of HACCP, "Validation" is officially defined as:
(A) The application of methods, procedures, tests and other evaluations, in addition to monitoring, to determine compliance with the HACCP plan.
(B) A written document delineating the procedures to be followed when a deviation occurs.
(C) Obtaining evidence that the elements of the HACCP plan are effective and capable of controlling the identified hazards.
(D) The physical tracking of a product from the consumer back to the raw material supplier.

47. Read the following statements regarding Verification and Validation in HACCP and select the correct option:
Statement I: Validation is typically performed before the HACCP plan is fully implemented or when significant changes are made.
Statement II: Verification involves ongoing routine activities, such as reviewing monitoring records and calibrating instruments, to ensure the plan is being followed.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

48. Consider the following statements regarding the records maintained under HACCP Principle 7 (Record-keeping):
1. The Hazard Analysis summary is a mandatory record.
2. CCP monitoring records are mandatory records.
3. Employee financial payroll records are mandatory records.
4. Corrective action logs are mandatory records.

Which of the above statement(s) is/are correct?
(A) 1, 2, and 4 only
(B) 2, 3, and 4 only
(C) 1 and 2 only
(D) 1, 3, and 4 only

49. Which of the following statements correctly represents a routine verification activity within a HACCP system?
(A) Conducting a scientific literature review to prove that cooking at 74°C kills E. coli.
(B) An independent supervisor reviewing and

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signing the daily CCP monitoring logs.
(C) Designing a brand new packaging material for a food product.
(D) Upgrading the accounting software for the purchasing department.

50. A food manufacturing company reviews its quarterly customer complaint logs and notices a spike in reports of "sour tasting" pasteurized milk. The QA team uses this data to reassess the pasteurization critical limits. In HACCP terminology, the review of customer complaints acts as a form of:
(A) Standard prerequisite programme implementation
(B) Continuous real-time process monitoring
(C) Field-level Good Agricultural Practice
(D) Verification of the HACCP plan's efficacy

51. Match the document/record type in List I with its corresponding example in List II and select the correct option:
List I: (Document/Record Types)
P. Support Documentation
Q. Monitoring Record
R. Corrective Action Record
S. Verification Record
List II: (Examples)
I. A log showing the destruction of a batch of undercooked meat
II. An internal audit report of the HACCP system
III. Scientific challenge study validating a $5-\log$ reduction
IV. Hourly temperature chart of a pasteurizer
(A) P-III, Q-IV, R-I, S-II
(B) P-IV, Q-III, R-II, S-I
(C) P-II, Q-I, R-IV, S-III
(D) P-III, Q-I, R-IV, S-II

52. Which of the following statements about the validation of a HACCP plan is incorrect?
(A) Validation confirms that the identified hazards are complete and correct.`
(B) Validation ensures that the critical limits will effectively control the hazards if adhered to.`
(C) Validation is a daily activity performed by the line operator during production.`
(D) Validation may require the use of external scientific experts or challenge studies.`

53. A bakery introduces a new gluten-free cookie. To ensure that the baking process effectively eliminates Salmonella, the QA team inoculates a test batch of dough with a safe surrogate bacterium and measures its survival after baking at the proposed time and temperature. This process is an example of:
(A) HACCP plan validation
(B) Routine monitoring
(C) Corrective action implementation
(D) Prerequisite verification

54. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): Robust record-keeping is an essential component of a successful HACCP system.
Reason (R): Accurate records provide verifiable evidence that CCPs were maintained within critical limits, which is vital for regulatory compliance and legal defense during foodborne illness investigations.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

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55. Which of the following is a correctly matched pair of a verification activity and its primary purpose?
(A) Employee handwashing - Validating the theoretical hazard analysis
(B) Thermometer calibration - Ensuring monitoring data remains accurate
(C) Supplier invoice review - Performing operational monitoring of a CCP
(D) Metal detector testing - Establishing a scientifically sound limit

56. A facility properly monitors its roasting temperatures and takes corrective actions when needed, but the line operators fail to write down the temperature readings on the official logs. What is the most likely consequence during a regulatory food safety audit?
(A) The facility will be formally commended by the auditing agency for actively reducing paper waste.
(B) The auditor will assume control was continuously maintained based entirely on

sterile, sealed metal cans

71. A food facility lacks adequate exhaust ventilation over its continuous open boilers. Over time, thick condensation forms on the ceiling above the food processing line. What is the most likely food safety consequence of this GMP failure?
(A) The processing room temperature will rise sharply, causing the open food to become rapidly dehydrated.
(B) Moisture buildup will promote mold growth and contaminate the open product via dripping condensation.
(C) Airborne dust and microscopic particulates will immediately settle on the wet floor of the packaging line.
(D) The overall ambient temperature of the processing room will drop below freezing due to the high steam volume.

72. Arrange the following steps in the correct order for a standard personnel gowning procedure before entering a High-Care food production area:
1. Wash and sanitize hands.
2. Put on hairnet and beard snood (if applicable).
3. Put on dedicated clean facility footwear/ shoe covers.
4. Put on clean protective overall/coat.

(A) 2-3-4-1
(B) 1-4-2-3
(C) 3-2-4-1
(D) 4-2-1-3

73. Which of the following materials is an EXCEPTION and is NOT recommended for use as a direct food-contact surface under standard GMP guidelines?
(A) Food-grade stainless steel
(B) High-density polyethylene (HDPE) plastic
(C) Food-grade silicone
(D) Galvanized iron

74. What is the most appropriate description of the main objective of Good Manufacturing Practices (GMP)?
(A) To ensure products are consistently produced according to safety and quality standards.
(B) To replace the operational need for an internal corporate quality assurance team.
(C) To define and standardize the chemical and molecular composition of every product.
(D) To prioritize facility designs that ensure the plant generates maximum financial profit.

75. Which of the following pairs comparing a GMP requirement to an observed practice is incorrectly matched (indicating a GMP violation)?
(A) Glass control - Use of shielded/shatterproof lighting fixtures over the processing line
(B) Personnel hygiene - Employees wearing visible bandages without gloves over them
(C) Pest control - Installation of air curtains at loading bay doors
(D) Waste management - Using clearly labeled, leak-proof, and covered bins for food waste

76. Good Laboratory Practices (GLP), as defined by the OECD, is a quality system concerned primarily with:
(A) The systematic financial auditing and bookkeeping of all laboratory operational and research expenditures.
(B) The organization and conditions under which non-clinical safety studies are planned, run, and reported.
(C) The phase-by-phase clinical testing and trial management of experimental pharmaceutical drugs on human subjects.
(D) The sensory validation, consumer panel evaluation, and taste-testing of newly formulated retail food products.

77. Read the following statements regarding personnel roles in Good Laboratory Practices (GLP) and select the correct option:
Statement I: The Study Director represents the single point of study control and bears ultimate responsibility for the overall conduct of the study.
Statement II: The Quality Assurance Unit (QAU) reports directly to the Study Director and assists in performing the daily laboratory experiments.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

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64. Which of the following statements correctly describes the GMP requirements for equipment design in a food plant?
(A) Equipment must be constructed of highly porous materials to absorb excess humidity and moisture in high-heat zones.
(B) Equipment must incorporate deep dead ends and sharp internal corners to successfully capture heavy physical particulates.
(C) Equipment must be designed for easy cleaning and inspection using smooth, non-corrosive, and non-toxic materials.
(D) Equipment must be permanently anchored directly to the floor without leaving any clearance for cleaning underneath.

65. In a meat processing plant, the same workers handle raw poultry and slice ready-to-eat deli meats, using the same unwashed aprons and sharing a single breakroom. Soon after, an outbreak of Listeriosis is linked to the deli meats. This scenario is a direct failure of which GMP component?
(A) Improper architectural facility lighting design
(B) Personnel zoning and cross-contamination control
(C) Regulatory packaged food labeling requirements
(D) Routine laboratory equipment calibration schedules

66. Match the GMP components in List I with their specific requirements in List II and select the correct option:
List I: (GMP Components)
P. Facility layout
Q. Sanitary facilities
R. Equipment maintenance
S. Personnel hygiene
List II: (Specific Requirements)
I. Provision of adequate handwashing stations with warm water and soap
II. Daily showering and wearing unsoiled uniforms
III. Implementing a preventive maintenance schedule to avoid breakdowns
IV. Physical separation of raw and cooked product zones
(A) P-IV, Q-I, R-III, S-II
(B) P-I, Q-IV, R-II, S-III
(C) P-IV, Q-II, R-III, S-I
(D) P-III, Q-I, R-IV, S-II

67. Which of the following statements regarding handwashing facilities under GMP is incorrect?
(A) Handwashing stations should be combined with equipment washing sinks to save space.
(B) Handwashing sinks must be located conveniently near the entrances to processing areas.
(C) Taps should ideally be non-hand operable (e.g., knee or foot pedals) to prevent re-contamination.
(D) Single-use paper towels or air dryers must be provided for drying hands.

68. When designing a new dairy processing room, the management must select materials for the walls. Applying GMP principles, which of the following materials is the most appropriate choice?
(A) Unsealed natural wood paneling with exposed grain
(B) Rough, untreated exposed brick to absorb moisture
(C) Smooth, light, washable, and waterproof epoxy panels
(D) Dark-colored porous concrete with high absorbency

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69. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): The junctions between walls and floors in a food processing facility should be coved (rounded) rather than angled at a sharp 90 degrees.
Reason (R): Coving prevents the accumulation of dirt and water in corners and facilitates easier and more effective cleaning.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

70. Which of the following pairs regarding hygiene zone classifications in a food facility is correctly matched?
(A) High-risk area - General receiving docks for unprocessed raw potatoes
(B) High-care area - Standard administrative offices for administrative staff
(C) Low-risk area - Slicing and active packaging of ready-to-eat deli meats
(D) Low-risk area - Packaging of commercially

(B) The receiving step is not a CCP since a later cooking step is designed to eliminate Salmonella.
(C) Both raw receiving and cooking must be designated as CCPs with identical critical limits.
(D) Salmonella is a chemical contaminant and thus cannot be controlled by any thermal step.

28. Which of the following would generally be considered an EXCEPTION and NOT classified as a valid CCP in a standard industrial bread-making process?
(A) Baking the dough at a specified temperature for a specified time.
(B) Checking the visual crust color of the bread for consumer appeal.
(C) Passing the final packaged bread through a calibrated metal detector.
(D) Sifting the bulk flour through a fine mesh screen before mixing.

29. What is the most appropriate first action a HACCP team should take when conducting a hazard analysis for a new product?
(A) Identify all potential biological, chemical, and physical hazards for each process step.
(B) Immediately draft and finalize the operational corrective action logs for the facility.
(C) Apply the multi-question CCP decision tree to every single incoming raw ingredient.
(D) Validate the microbiological expiration and stability dates of the final product.

30. Which of the following pairs regarding hazard characterization is incorrectly matched?
(A) Histamine in scombroid fish - Chemical hazard
(B) Bone fragments in minced meat - Physical hazard
(C) Agricultural antibiotic residue - Physical hazard
(D) Norovirus pathogens on produce - Biological hazard

31. HACCP Principle 3 requires the establishment of Critical Limits. What exactly does a critical limit represent?
(A) The maximum financial cost that the facility is willing to allocate to control a hazard.
(B) The maximum allowable number of operational CCPs configured within a single HACCP plan.
(C) The absolute minimum number of prerequisite programs that a facility is required to have.
(D) A maximum or minimum value to which a safety parameter must be controlled at a CCP.

32. Read the following statements regarding monitoring procedures at a Critical Control Point (CCP) and select the correct option:
Statement I: Continuous monitoring systems are always preferred over non-continuous monitoring if technologically and economically feasible.
Statement II: If monitoring is not continuous, the frequency of monitoring must be sufficient to ensure that the CCP is under control.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

33. Consider the following statements regarding a proper corrective action protocol under HACCP:
1. Identifying and isolating the affected product is a fundamental requirement.
2. Determining the root cause of the deviation is a fundamental requirement.
3. Taking measures to bring the process back under control is a fundamental requirement.
4. Altering the hazard analysis to classify the CCP as a generic CP is a fundamental requirement.

Which of the above statement(s) is/are correct?
(A) 1, 2, and 3 only
(B) 2, 3, and 4 only
(C) 1 and 3 only
(D) 1, 2, 3, and 4

34. Which of the following statements correctly describes the process of establishing critical limits?
(A) Critical limits are based on arbitrary estimates agreed upon solely by facility management.
(B) A single, standardized critical limit must apply uniformly to all identified CCPs across the facility.

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78. Consider the following statements regarding organizational components required for Good Laboratory Practices (GLP) compliance:
1. Standard Operating Procedures (SOPs) are required.
2. A Quality Assurance Unit (QAU) is required.
3. A Master Schedule is required.
4. Consumer Marketing Data is required.

Which of the above statement(s) is/are correct?
(A) 1, 2, and 3 only
(B) 2, 3, and 4 only
(C) 1 and 2 only
(D) 1, 3, and 4 only

79. Which of the following statements correctly describes the role of the Quality Assurance Unit (QAU) under OECD GLP principles?
(A) The QAU is responsible for designing the scientific methodology, study plan, and statistical parameters.
(B) The QAU must be directly involved in performing the actual laboratory procedures to ensure absolute accuracy.
(C) The QAU is solely responsible for managing the human resources, including hiring and firing laboratory staff.
(D) The QAU is an independent body that monitors the study to ensure compliance with all GLP principles.

80. A laboratory technician receives a new batch of pesticide standard to be used in a food residue study. According to GLP principles regarding test and reference items, what must the technician immediately ensure?
(A) That the item is stored in an unlabeled container to blind the analytical study.
(B) That the standard is mixed with older batches to optimize laboratory storage space.
(C) That the item is properly labeled with expiry and logged for custody tracking.
(D) That the standard is immediately discarded if older than one week, regardless of expiry.

81. Match the GLP terms in List I with their definitions in List II and select the correct option:
List I: (GLP Terms)
P. Standard Operating Procedure (SOP)
Q. Master Schedule
R. Raw Data
S. Archives
List II: (Definitions)
I. A compilation of all studies conducted at the test facility to track workload and status
II. Designated secure areas for the storage and retrieval of study plans, raw data, and final reports
III. Original records and documentation resulting from the original observations in a study
IV. Documented procedures describing how to perform specific routine laboratory tests or activities
(A) P-IV, Q-I, R-III, S-II
(B) P-I, Q-IV, R-II, S-III
(C) P-IV, Q-II, R-I, S-III
(D) P-III, Q-I, R-IV, S-II

82. Which of the following statements regarding the archiving of records under GLP is incorrect?
(A) Archives must be physically secure and access must be strictly restricted to authorized laboratory personnel only.
(B) Raw study data, original plans, and final completed reports must be retained for a legally specified period.
(C) Environmental conditions in the archive must be controlled to prevent degradation of documents and electronic media.
(D) Only the final printed report must be archived, allowing raw analytical data to be discarded to save space.

83. A food safety laboratory receives a batch of apple samples for heavy metal testing. To comply with GLP, how should the samples be managed upon receipt?
(A) Logged into a tracking system, assigned a unique code, and stored under proper conditions to prevent degradation.
(B) Placed on a random open laboratory benchtop without labeling until a certified technician becomes available.
(C) Washed thoroughly with strong chemical detergents to ensure the surfaces are clean before conducting tests.
(D) Tested immediately by the analyst without any formal documentation to provide rapid turnaround to the client.

84. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): The Quality Assurance Unit (QAU) in a GLP-compliant laboratory must

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information.
(D) It completely replaces the operational need for printing an expiration date on perishable goods.

125. A food manufacturer uses an Enterprise Resource Planning (ERP) system. A supplier notifies them that a specific batch of cumin powder is contaminated with lead. How should the manufacturer utilize the ERP system?
(A) Query the database to identify and block all intermediate or finished products containing that cumin lot.
(B) Automatically delete the cumin lot from all active digital inventory records to completely avoid regulatory fines.
(C) Calculate the estimated financial losses and generate an automated emergency public press release immediately.
(D) Automatically generate, update, and validate a brand new facility-wide HACCP plan for cumin processing.

126. Match the traceability terms in List I with their standard definitions in List II and select the correct option:
List I: (Traceability Terms)
P. Tracing (Backward traceability)
Q. Tracking (Forward traceability)
R. Lot Code
S. Batch Record
List II: (Standard Definitions)
I. A unique string of numbers/letters identifying a specific production run
II. Document detailing all ingredients, amounts, and parameters used for a specific run
III. The ability to identify the destination of a product from the manufacturer to the retailer
IV. The ability to identify the origin of ingredients used in a finished product
(A) P-IV, Q-III, R-I, S-II
(B) P-III, Q-IV, R-II, S-I
(C) P-IV, Q-III, R-II, S-I
(D) P-I, Q-II, R-IV, S-III

127. Which of the following statements about the use of Enterprise Resource Planning (ERP) systems in food safety is incorrect?
(A) ERP systems integrate various business processes, including inventory management and traceability.
(B) A properly configured ERP system can significantly reduce the time required to conduct a product recall.
(C) ERP systems can enforce a "hold" status on suspect products, preventing their accidental shipment.
(D) ERP systems eliminate all human errors associated with physically labeling pallets in the warehouse.

128. A facility produces orange juice and wants to create a robust lot code format. Which of the following formats provides the most functional traceability data for an internal batch record?
(A) "Orange Juice - Premium Grade Quality Description Label"
(B) "PROD-2023-YEARLY-STANDARD-PRODUCTION-RUN-CODE-001"
(C) "OJ-23295-L2-0830" (Product-Date-Line-Time Code)
(D) "Batch A - Morning Shift 1 - Mixing Vat Container 4"

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129. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): Implementing a state-of-the-art traceability system does not, by itself, make food safer to consume.
Reason (R): Traceability is an information management tool that facilitates the rapid removal of unsafe food from the market, but it does not physically prevent or eliminate hazards during processing.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

130. Which of the following pairs is correctly matched regarding the direction of traceability?
(A) Forward traceability - Identifying the farm that supplied the contaminated milk
(B) Backward traceability - Determining which supermarket chains received the affected cheese
(C) External traceability - Mapping the movement of product strictly between processing room 1 and processing room 2
(D) Internal traceability - Tracking an ingredient from the receiving dock to its inclusion in a finished product lot

(B) Farm practices ensuring safe, high-quality crop production and environmental sustainability.
(C) The wholesale distribution, shipping, and supermarket shelf display of canned food goods.
(D) The clinical testing, development, and trial monitoring of experimental animal drugs.

92. Read the following statements regarding pesticide use under Good Agricultural Practices (GAP) and select the correct option:
Statement I: The Pre-Harvest Interval (PHI) is the minimum amount of time that must pass between the last pesticide application and the harvesting of the crop.
Statement II: Harvesting a crop before the PHI has elapsed guarantees that the pesticide residues will be zero.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

93. Consider the following statements regarding agricultural water practices under Good Agricultural Practices (GAP):
1. Testing irrigation water for generic E. coli and other fecal indicators is aligned.
2. Using untreated surface water to dilute pesticides applied just before harvest is aligned.
3. Preventing livestock runoff from entering agricultural water sources is aligned.
4. Documenting water quality test results and taking corrective actions if limits are exceeded is aligned.

Which of the above statement(s) is/are correct?
(A) 1, 2, and 4 only
(B) 1, 3, and 4 only
(C) 2 and 3 only
(D) 1, 2, 3, and 4

94. Which of the following statements correctly describes post-harvest handling requirements under GAP?
(A) Harvested produce must be cooled down as slowly as possible to prevent any superficial thermal shock.
(B) Fresh produce should be washed in recycled, untreated surface water to conserve natural resources.
(C) Packing equipment and storage containers must be regularly sanitized to prevent microbial cross-contamination.
(D) Harvested crops must be stored directly on raw, unshaded field soil to maintain initial freshness.

95. A farm utilizes overhead sprinkler irrigation using water from a nearby stream. Following a heavy rainstorm, a herd of cattle grazes upstream. Two weeks later, lettuce harvested from this farm is linked to an E. coli O157:H7 outbreak. This scenario indicates a failure in which GAP component?
(A) Sustainable soil management and fertilizer usage
(B) Proper, label-compliant pesticide application
(C) Post-harvest cooling and temperature control
(D) Agricultural water quality and risk assessment

96. Match the agricultural inputs in List I with the primary food safety hazards they may introduce in List II if not managed via GAP and select the correct option:
List I: (Agricultural Inputs)
P. Raw, uncomposted manure
Q. Agricultural water (surface)
R. Chemical pesticides
S. Harvesting machinery
List II: (Primary Food Safety Hazards)
I. Residues exceeding Maximum Residue Limits (MRLs)
II. Pathogens like Salmonella and E. coli from fecal matter
III. Pathogens from agricultural runoff or wildlife
IV. Physical contaminants like metal shavings or grease
(A) P-II, Q-III, R-I, S-IV
(B) P-III, Q-II, R-I, S-IV
(C) P-II, Q-I, R-III, S-IV
(D) P-I, Q-III, R-II, S-IV

97. Which of the following statements regarding the use of biological soil amendments (like manure) under GAP is incorrect?
(A) Raw manure must never be applied directly to the edible parts of crops close to harvest.
(B) Untreated human sewage sludge is

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correct.

138. Consider the following statements regarding a comprehensive food recall plan:
1. Assembling the recall management team is a standard component.
2. Identifying all affected product lots and their distribution locations is a standard component.
3. Notifying the regulatory authorities and the public is a standard component.
4. Retrieving and safely disposing of or reworking the affected product is a standard component.

Which of the above statement(s) is/are correct?
(A) 1, 2, and 4 only
(B) 2, 3, and 4 only
(C) 1, 3, and 4 only
(D) 1, 2, 3, and 4

139. Which of the following statements correctly describes a "mock recall" exercise?
(A) An actual product recall executed to discipline floor operators for poor performance.
(B) A simulated exercise testing the efficiency of a facility's recall tracking system.
(C) A legal term for a recall that was ordered by a regulatory judge but later canceled.
(D) A tactical marketing strategy designed to create false product scarcity in the market.

140. A company discovers that its chocolate chip cookies were accidentally packed in bags labeled "Oatmeal Raisin," failing to declare the presence of wheat and soy (major allergens). Because consumption by an allergic individual could cause anaphylaxis, how must this recall be classified?
(A) Class II recall
(B) Class I recall
(C) Class III recall
(D) Market Withdrawal

141. Match the Recall Classification in List I with its corresponding scenario in List II and select the correct option:
List I: (Recall Classifications)
P. Class I Recall
Q. Class II Recall
R. Class III Recall
S. Market Withdrawal
List II: (Scenarios)
I. Incorrect font size on the nutritional label; no health hazard
II. Presence of a low-level undeclared color additive causing temporary, medically reversible distress
III. Routine rotation of stock due to the product nearing its "best before" date, no legal violation
IV. Detection of Clostridium botulinum toxin in canned soup
(A) P-IV, Q-II, R-I, S-III
(B) P-IV, Q-I, R-II, S-III
(C) P-II, Q-IV, R-III, S-I
(D) P-I, Q-II, R-III, S-IV

142. Which of the following statements regarding the disposal of recalled products is incorrect?
(A) Recalled products must be distinctly marked and stored in a secure, segregated area to prevent accidental re-entry into commerce.
(B) The regulatory authority may require witnessing the destruction of a Class I recalled product.
(C) Recalled products contaminated with pathogenic bacteria can be safely donated to local food banks to prevent food waste.
(D) Complete records of the volume of product destroyed must be maintained for mass balance reconciliation.

143. During a mock recall, a facility traces that it produced 1,000kg of a specific batch. They locate 200 kg in their own warehouse and verify through shipping records that 750 kg were sent to three distributors. What is the calculated percent recovery (mass balance), and what does the missing 50 kg imply?
(A) 100% recovery; the missing mass is considered within standard margins of error for evaporation.
(B) 75% recovery; the facility is permitted to ignore warehouse stock and focus on distributor records.
(C) 50% recovery; the database tracking system is verified to be functioning perfectly without actions.
(D) 95% recovery; the missing mass indicates a tracking flaw or undocumented loss requiring investigation.

144. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): Conducting a root cause analysis is a vital step following any food safety recall.

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(D) To ensure all standard farms transition exclusively to hydroponic systems.

105. Which of the following pairs of a GAP practice and the specific hazard it prevents is incorrectly matched?
(A) Excluding domestic animals from fields - Prevents fecal pathogen contamination
(B) Calibrating pesticide sprayers - Prevents exceeding Maximum Residue Limits (MRLs)
(C) Providing field toilets and handwashing stations - Prevents human pathogen contamination (e.g., Norovirus)
(D) Using potable water for flume washing - Prevents heavy metal uptake by plant roots

106. In the context of Good Hygienic Practices (GHP), what is the fundamental difference between "cleaning" and "sanitation/disinfection"?
(A) Cleaning removes visible organic soil, while sanitation reduces microorganisms to safe levels.
(B) Cleaning kills all surface bacteria, whereas sanitation only removes visible loose dirt.
(C) Cleaning relies entirely on hot water, while sanitation must only use chemical cold water.
(D) Cleaning is done exclusively on food contact surfaces, while sanitation is only done on floors.

107. Read the following statements regarding Cleaning and Disinfection (C&D) programmes and select the correct option:
Statement I: Sanitizers are generally most effective when applied directly to a surface heavily soiled with organic matter.
Statement II: A surface must be thoroughly cleaned and rinsed to remove organic soils before an appropriate sanitizer can be effectively applied.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

108. Consider the following statements regarding core areas of standard Sanitation Standard Operating Procedures (SSOPs):
1. Safety of the water that comes into contact with food or food contact surfaces is a core area.
2. Prevention of cross-contamination from insanitary objects to food is a core area.
3. Maintenance of handwashing, hand sanitizing, and toilet facilities is a core area.
4. Protection of food from adulteration with lubricants, fuel, or condensation is a core area.

Which of the above statement(s) is/are correct?
(A) 1, 2, and 3 only
(B) 2, 3, and 4 only
(C) 1, 3, and 4 only
(D) 1, 2, 3, and 4

109. Which of the following statements correctly describes a robust pest control program under GHP?
(A) The facility perimeter must prevent pest entry using mesh screens, air curtains, and bait stations.
(B) Toxic chemical rodent baits should be placed openly on active food processing tables to maximize catch.
(C) Domestic cats should be kept inside the food production facility to naturally control the mouse population.
(D) Liquid pesticides should be sprayed routinely directly over open food vats to eliminate flying insects.

110. A dairy processing plant notices that despite daily sanitation with chlorine, bacterial counts on a stainless steel vat remain high. An investigation reveals a thin, slimy layer on the vat surface. This indicates that inadequate initial cleaning led to:
(A) The chemical accumulation of toxic sanitizer residues on the vat.
(B) The crystallization and buildup of lactose on the stainless vat walls.
(C) The formation of a biofilm that shields bacteria from the sanitizer.
(D) Microscopic metal corrosion that overrides the sanitizer's chemical efficacy.

111. Match the chemical sanitizers in List I with their characteristic features in List II and select the correct option:
List I: (Chemical Sanitizers)
P. Chlorine (Hypochlorites)
Q. Quaternary Ammonium Compounds

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(Quats)
R. Peracetic Acid (PAA)
S. Iodine (Iodophors)
List II: (Characteristic Features)
I. Effective against biofilms, leaves no toxic residue (breaks down to acetic acid and water)
II. Broad spectrum, inexpensive, but highly corrosive and inactivated by organic matter
III. Leaves a residual antimicrobial film, effective on floors and walls, poor against spores
IV. Brown color indicates active strength, less affected by organic matter than chlorine, stains surfaces
(A) P-II, Q-III, R-I, S-IV
(B) P-I, Q-II, R-III, S-IV
(C) P-II, Q-IV, R-I, S-III
(D) P-III, Q-II, R-IV, S-I

112. Which of the following statements regarding Clean-in-Place (CIP) systems is incorrect?
(A) CIP systems circulate cleaning and sanitizing solutions through pipelines and enclosed equipment without dismantling them.
(B) Fluid flow velocity (turbulence) is a critical factor for effective soil removal in a CIP system.
(C) CIP systems eliminate the need for any chemical sanitizers by relying entirely on high-pressure cold water.
(D) Dead ends and crevices in piping can create "shadow areas" where CIP is ineffective.

113. When developing a Sanitation Standard Operating Procedure (SSOP) for a commercial meat slicer, which of the following instructions is the most crucial for ensuring food safety?
(A) Ensuring the machine remains plugged in during the entire cleaning process to maintain internal heat.
(B) Dismantling the blade and carriage to clean and sanitize all hidden food contact surfaces.
(C) Wiping down the fully assembled slicing machine using a dry, un-sanitized microfiber cloth only.
(D) Spraying high-pressure water streams directly onto the exposed electrical motor block of the machine.

114. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): In a standard food plant sanitation protocol, cleaning steps must always precede sanitizing steps.
Reason (R): The presence of organic soils (proteins, fats) can rapidly neutralize active sanitizing agents, rendering them ineffective against microorganisms.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

115. Which of the following pairs correctly identifies the four key factors (TACT) required for effective cleaning energy in GHP?
(A) Time, Action (Mechanical), Concentration (Chemical), Temperature
(B) Toxicity, Alkalinity (Chemical), Corrosion (damage), Turbidity
(C) Testing, Auditing (Verification), Checking (process), Tracing
(D) Temperature, Acidity (pH), Concentration (strength), Titration

116. A facility in an area with very "hard" water (high calcium/magnesium) notices that their standard alkaline detergent is not foaming or cleaning effectively, and a white scale is building up on equipment. What is the cause-and-effect relationship here?
(A) Hard water lowers the water's boiling point, preventing it from reaching proper cleaning temperatures.
(B) Hard water evaporates quickly, leaving hazardous and corrosive chlorine gas deposits behind.
(C) Hard water minerals bind detergent surfactants, decreasing efficacy and forming mineral scale.
(D) Hard water minerals directly mutate common processing bacteria to become detergent-resistant.

117. As an auditor inspecting a facility's pest control program, you find internal rodent bait stations equipped with toxic bait located directly adjacent to a raw ingredient mixing vat. What is your competency-based assessment?
(A) This is a critical violation; toxic baits are prohibited in processing areas due to chemical contamination risk.
(B) This is acceptable because it ensures rodents

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are exterminated immediately before they can reach raw ingredients.
(C) This is a recommended pest control practice according to standard international food hygiene guidelines.
(D) It is acceptable only if the bait is colored bright pink to easily distinguish it from standard food items.

118. Which of the following is an EXCEPTION and is NOT considered a standard method of sanitizing food contact surfaces in a food plant?
(A) Application of a sodium hypochlorite solution at 200 ppm.
(B) Immersing equipment in hot water ($> 82^{\circ}C$) for a specified time.
(C) Circulating peracetic acid through enclosed piping (CIP).
(D) Wiping surfaces with untreated, recycled graywater.

119. What is the most appropriate first step in a standard 5-step Cleaning and Disinfection (C&D) programme?
(A) Application of hot water and formulated chemical detergent
(B) Dry clean / gross soil removal (sweeping, scraping)
(C) Application of active, approved chemical sanitizer
(D) Final sanitizing rinse using potable hot water

120. Which of the following pairs of pests and their characteristic evidence of infestation is incorrectly matched?
(A) Rodents - Droppings, gnaw marks, and grease smears
(B) Cockroaches - Egg cases (oothecae) and a strong, oily odor
(C) Birds - Small, perfectly round boreholes in wooden pallets
(D) Weevils/Stored Product Insects - Webbing in flour bins and damaged kernels

121. In food traceability systems, the "one-up, one-down" principle refers to the requirement that a food business must:
(A) Trace the product back to the primary agricultural farm and forward to the final consumer.
(B) Keep compliance records for exactly one calendar year up and one calendar year down.
(C) Upgrade database software one version up and one version down annually.
(D) Trace a product back to its immediate supplier and forward to its immediate customer.

122. Read the following statements regarding traceability and select the correct option:
Statement I: Internal traceability refers to the tracking of raw materials and ingredients as they are processed into finished products within a single facility.
Statement II: External traceability relies entirely on verbal agreements between suppliers and retailers without the need for documented lot codes.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

123. Consider the following statements regarding an effective food traceability system:
1. Unique identification of lots or batches is a core component.
2. Linkage between raw materials received and finished goods dispatched is a core component.
3. Rapid information retrieval systems are a core component.
4. Standardized packaging graphics to boost consumer sales are a core component.

Which of the above statement(s) is/are correct?
(A) 1, 2, and 4 only
(B) 1, 2, and 3 only
(C) 2, 3, and 4 only
(D) 1, 3, and 4 only

124. Which of the following statements correctly explains the significance of lot coding in a traceability system?
(A) It dictates the final retail pricing and shelf-positioning of the packaged food product.
(B) It identifies when, where, and from what ingredients a batch was made, confining the recall scope.
(C) It provides final consumers with detailed macro-nutritional and ingredient safety

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be entirely independent from the personnel directing and conducting the study.
Reason (R): Independence prevents conflicts of interest and ensures that QA audits and inspections remain objective and unbiased.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

85. Which of the following pairs of GLP personnel and their primary responsibilities is correctly matched?
(A) Study Director - Approving the study plan and taking ultimate responsibility for execution
(B) QAU - Conducting the daily chemical analyses and logging raw experimental data in notebooks
(C) Test Facility Management - Archiving the final experimental and toxicology reports independently
(D) Archivist - Approving and distributing the official Standard Operating Procedures to staff

86. During a GLP study on a food additive, a technician notices that a reagent is slightly past its expiration date but decides to use it anyway to save time, without documenting the deviation. What is the cause-and-effect consequence of this action on the study?
(A) It decreases the total operational cost of the study without introducing any negative effects on accuracy.
(B) It causes a deviation that compromises study integrity and may invalidate the entire analytical dataset.
(C) It automatically triggers a facility-wide regulatory audit and a permanent shutdown of all laboratory rooms.
(D) It significantly accelerates the final publication and acceptance of the study in peer-reviewed journals.

87. As an external auditor reviewing a GLP-certified food testing lab, you discover that an HPLC machine used for quantifying pesticide residues has no calibration records for the past year. What is the most appropriate competency-based finding?
(A) Note it as a minor administrative issue, provided the analyst can demonstrate the machine currently powers on.
(B) Raise a major non-conformance, as GLP mandates regular equipment calibration with records to ensure accuracy.
(C) Suggest the lab immediately switch to a manual analytical method that does not require instrument calibration.
(D) Validate the analytical performance of the machine yourself during the audit to quickly clear the finding.

88. Which of the following is an EXCEPTION and is NOT a required function of the Quality Assurance Unit (QAU) under GLP?
(A) Conducting inspections of the study at various phases.
(B) Reviewing the final study report to confirm it accurately reflects the raw data.
(C) Writing and signing the final study report to verify its scientific conclusion.
(D) Maintaining copies of all approved study plans and SOPs.

89. What is the most appropriate reason for requiring Good Laboratory Practices (GLP) in food safety testing and toxicological studies?
(A) To guarantee that all chemical additives are entirely safe and risk-free for human health.
(B) To mandate that all certified labs use the exact same brand of analytical equipment.
(C) To provide a comprehensive regulatory alternative to the HACCP system in manufacturing.
(D) To ensure the generation of high-quality, reliable, and mutually acceptable test data.

90. Which of the following pairs regarding GLP records is incorrectly matched?
(A) Final report - A marketing summary of product safety for consumers
(B) Raw data - Original laboratory worksheets and raw instrument printouts
(C) Study plan - The document defining objectives and experimental design
(D) SOP - Written instructions for performing routine laboratory operations

91. Good Agricultural Practices (GAP) primarily focus on:
(A) The chemical formulation, testing, and processing of synthetic artificial food colors.

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131. A warehouse manager decides to combine several partial pallets of finished products from different production days into one large pallet, applying only a single new generic barcode to save space. What is the cause-and-effect result of this action during a recall?
(A) It causes a loss of trace resolution, forcing the recall of the entire combined pallet if one batch is compromised.
(B) It significantly increases the long-term data accuracy and operational efficiency of the warehouse ERP system.
(C) It significantly speeds up the forward tracking process during an emergency regulatory investigation.
(D) It completely nullifies the ongoing regulatory need for maintaining standard manual HACCP logs.

132. Arrange the following steps in the logical sequence for conducting a backward trace of a defective finished product:
1. Identify the lot code of the defective finished product.
2. Review the batch production record associated with that lot code.
3. Identify the specific lot codes of all raw materials and packaging used in that batch.
4. Review receiving logs to identify the suppliers of those raw material lots.

(A) 1-2-3-4
(B) 2-1-4-3
(C) 1-3-2-4
(D) 4-3-2-1

133. Which of the following is an EXCEPTION and is NOT typically required information on a standard production batch record for traceability purposes?
(A) The home addresses of the line workers involved in production.
(B) The exact quantities and lot numbers of raw materials added.
(C) The signature or initials of the operator who added the ingredients.
(D) The date and time of production.

134. What is the most appropriate key benefit of using an electronic ERP system over a paper-based system for a Food Safety Management System (FSMS)?
(A) It guarantees that pathogens are automatically eliminated from the production line.
(B) It allows the facility to legally bypass all standard external regulatory inspections.
(C) It completely replaces the need for physical monitoring at Critical Control Points.
(D) It provides real-time traceability data, accelerating recall and mass balance calculations.

135. Which of the following pairs linking a supply chain node to its primary traceability responsibility is incorrectly matched?
(A) Farmer/Grower - Recording pesticide applications and harvest dates
(B) Final Consumer - Maintaining detailed logs of one-up, one-down data
(C) Manufacturer - Linking raw ingredient lots to finished product lot codes
(D) Distributor - Tracking the lot codes shipped to specific retail locations

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136. In food safety, what is the core difference between a "Food Recall" and a "Market Withdrawal"?
(A) Recalls involve minor quality defects, while withdrawals involve severe, life-threatening health risks.
(B) Recalls apply to imported products, while withdrawals apply exclusively to domestic manufactured goods.
(C) Recalls involve safety violations and hazards, while withdrawals are for minor quality issues without legal action.
(D) Recalls are always voluntary actions, while withdrawals are always legally mandated by a federal court order.

137. Read the following statements regarding the classification of food recalls and select the correct option:
Statement I: A Class I recall is a situation in which there is a reasonable probability that the use of the product will cause serious adverse health consequences or death.
Statement II: A Class III recall involves products that are extremely likely to cause severe permanent illness.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is

recommended as an organic fertilizer for fresh produce.
(C) Composting manure using validated time and temperature controls reduces the risk of pathogens.
(D) Proper storage of manure is necessary to prevent runoff into irrigation water sources.

98. A farmer wants to apply a fungicide to a tomato crop. To comply with GAP, how should the farmer determine the correct application rate and safety precautions?
(A) Ask neighboring farmers for their standard mix ratios and replicate their spraying frequency.
(B) Apply double the recommended chemical dose to guarantee the targeted fungus is fully eradicated.
(C) Dilute the pesticide until it has no visible color to avoid leaving any residues on tomatoes.
(D) Follow the instructions, application rates, and PHIs specified on the registered product label.

99. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): Traceability in the food supply chain should ideally begin at the farm level using GAP principles.
Reason (R): Keeping records of plot numbers, seed varieties, agrochemical applications, and harvest dates allows rapid identification of the source if a contamination issue arises.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

100. Which of the following pairs regarding water usage in GAP is correctly matched?
(A) Potable water - Used for mixing agrochemicals for soil application
(B) Surface irrigation water - Used for final washing of ready-to-eat produce
(C) Potable water - Used for handwashing and post-harvest produce washing
(D) Untreated pond water - Used for making ice to chill harvested broccoli

101. A farmer applies an insecticide to a spinach crop and harvests it two days later, ignoring the label's 14-day Pre-Harvest Interval (PHI). What is the direct regulatory effect of this action?
(A) The spinach will likely contain pesticide residues exceeding the legal maximum residue limit.
(B) The harvested spinach will be officially certified and marketed as organically grown produce.
(C) The harvested spinach will naturally benefit from a significantly extended product shelf life.
(D) The farmer will receive a financial agricultural subsidy for performing efficient harvesting.

102. Arrange the following Good Agricultural Practices (GAP) related to pesticide use in the correct chronological sequence:
1. Identify the pest and determine if a pesticide is necessary (Integrated Pest Management).
2. Select an approved, registered pesticide for the specific crop.
3. Observe the mandatory Pre-Harvest Interval (PHI).
4. Apply the pesticide using calibrated equipment and proper PPE.
(A) 1-2-4-3
(B) 2-1-3-4
(C) 1-4-2-3
(D) 4-3-2-1

103. Which of the following is an EXCEPTION and is NOT a recommended post-harvest handling practice under GAP?
(A) Cooling produce quickly after harvest to remove field heat.
(B) Transporting fresh produce in open trucks alongside live poultry.
(C) Training harvest workers on proper hygiene and handwashing.
(D) Culling visibly rotten or damaged produce during packing.

104. What is the most appropriate description of the primary aim of Good Agricultural Practices (GAP)?
(A) To eliminate the usage of all synthetic agricultural chemicals globally.
(B) To maximize short-term crop yields at the expense of long-term soil health.
(C) To produce safe food by minimizing hazards at pre-harvest and harvest stages.

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Reason (R): Identifying the fundamental reason the hazard occurred allows the facility to implement permanent corrective and preventive actions, preventing future recurrences.

(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

145. Which of the following pairs regarding recall communication is correctly matched?
(A) Trade Notification - A comprehensive press release broadcast on national news networks and television.
(B) Health Hazard Evaluation - Risk assessment by experts to determine the safety risk and recall class
(C) Public Warning - A restricted corporate email sent exclusively to wholesale buyers and major distributors.
(D) Recall Termination - The initial mandatory phone call made to the local government regulatory agency.

146. A company initiates a Class I recall for E. coli in spinach but delays notifying the public and its retail partners for two weeks to avoid bad press. What is the most likely cause-and-effect consequence?
(A) The bacteria will naturally die off during storage, solving the safety problem without public actions.
(B) The regulatory agencies will lower the recall to a Class III level due to the passage of time.
(C) The recall will be automatically reclassified as a standard, non-actionable market withdrawal.
(D) Consumers will purchase the product, causing preventable illnesses and severe reputational damage.

147. As an auditor reviewing a facility's FSMS, you review their latest mock recall report. The report states they traced 100% of a product lot within 14 days. Based on modern FSMS competency standards, how should you evaluate this?
(A) Unacceptable; standard mock recalls must demonstrate the ability to trace products within hours, not weeks.
(B) Excellent performance; a two-week period represents an extremely rapid response time in standard industry.
(C) Acceptable performance, provided the facility currently utilizes a manual, paper-based logging system.
(D) Unacceptable performance because a mock recall must always trace multiple distinct product lots simultaneously.

148. Which of the following is an EXCEPTION and is NOT a valid reason for initiating a Class III recall?
(A) A minor labeling defect, such as missing the zip code of the manufacturer.
(B) The presence of a small piece of harmless, non-choking hazard paper in the packaging.
(C) The discovery of live Salmonella in a batch of roasted peanuts.
(D) A slight deviation in the declared net weight of a cereal box.

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149. What is the most appropriate main objective of an FSMS (Food Safety Management System) audit?
(A) To systematically examine if food safety activities comply with planned arrangements and standards.
(B) To identify specific operational deficiencies and find a valid legal reason to fire the QA manager.
(C) To determine and analyze the long-term financial profitability and viability of the manufacturing plant.
(D) To design and execute a brand new retail marketing campaign based on verified clean label parameters.

150. Which of the following pairs detailing the types of FSMS audits is incorrectly matched?
(A) First-party audit - An internal audit conducted by the organization on itself
(B) Second-party audit - An audit conducted by a primary organization on its suppliers
(C) Third-party audit - An audit conducted by an independent certification body (e.g., ISO, GFSI)
(D) First-party audit - An audit conducted by a government regulatory inspector

ANSWERS

1. (B) The NASA manned space program
The Hazard Analysis and Critical Control Point system originated in the nineteen-sixties through a collaborative effort involving the Pillsbury Company, the United States Army Natick Laboratories, and the National Aeronautics and Space Administration. This preventive system was specifically designed to ensure absolute microbial safety of food products manufactured for astronauts participating in manned space flights.

2. (D) Statement I is incorrect but Statement II is correct.
Prerequisite programs establish the foundational environmental and operational conditions necessary for producing safe food, addressing general facility hygiene rather than specific chemical hazards alone. These programs must be fully implemented and validated before establishing a food safety system, ensuring a sanitary baseline that supports the critical control points managed under subsequent risk-assessment protocols.

3. (A) 1, 2, and 4 only
The system was pioneered in collaboration with space agencies and military researchers, and its seven core principles were later formalized by the National Advisory Committee on Microbiological Criteria for Foods. International standardization was achieved when the Codex Alimentarius Commission adopted these guidelines, establishing a preventative framework rather than relying on reactive end-product testing.

4. (C) It integrates programs to prevent, eliminate, or reduce safety hazards to acceptable levels.
A food safety management system provides a systematic approach to identifying, evaluating, and controlling food safety hazards. By integrating prerequisite programs with preventive hazard control plans, the system coordinates facility-wide measures to prevent contamination, eliminate potential biological, chemical, or physical hazards, or reduce them to scientifically validated safe thresholds throughout the manufacturing process.

5. (A) Ventilation and facility air quality should be managed through Prerequisite Programmes (PRPs) prior to HACCP implementation.
Facility infrastructure issues, such as ventilation, air quality, and general sanitary conditions, are foundational elements of food safety. These elements are designed to be managed through prerequisite programs before applying process-specific hazard analysis. Attempting to address these general environmental parameters through a process hazard plan misapplies the preventive framework and compromises systematic hazard control.

6. (A) P-III, Q-II, R-IV, S-I
Agricultural standards focus on clean farming water, proper pesticide application, and soil health. Manufacturing and hygienic guidelines address general operational environments and personnel hygiene in processing plants. Laboratory quality systems ensure the integrity, reproducibility, and reliability of analytical safety testing data, providing a structured approach across all distinct sectors of the global food supply chain.

7. (B) Deviations in PRPs always require an immediate recall of the entire production batch.
Deviations in prerequisite programs typically indicate a failure in the facility's baseline sanitation rather than an immediate, direct compromise of food safety requiring a product recall. While these deviations demand corrective actions to restore sanitary operating conditions, they do not automatically mandate a full recall unless a critical control point is also compromised.

8. (C) Personnel hygiene and zoning under Prerequisite Programmes
Cross-contamination between raw and finished processing areas represents a significant food safety hazard. This risk is managed by establishing strict personnel hygiene protocols, protective clothing requirements, and physical zoning under foundational prerequisite programs. Correcting these operational and movement-based issues prevents the mechanical transfer of pathogens before they reach critical control points in processing.

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9. (C) A is true but R is false.
The food safety system operates on a preventive basis by identifying and controlling hazards at critical points throughout the production process. Relying heavily on end-product testing is a reactive approach that is statistically unreliable for ensuring safety, as it cannot guarantee the detection of localized pathogens or physical contamination in unsampled units.

10. (A) Principle 4 - Establishing monitoring procedures for CCPs
The fourth principle of the food safety framework focuses on establishing monitoring procedures to assess whether critical control points remain within defined boundaries. This phase involves systematic observations or measurements, providing real-time data to verify process control, whereas conducting hazard analysis, setting limits, and implementing corrective actions are assigned to other specific principles.

11. (B) A failure in foundational Prerequisite Programmes can compromise a valid HACCP plan.
Food safety relies on a dual-tier framework where process-specific controls are supported by general facility hygiene. Even when pasteurization limits are fully met, inadequate sanitation of subsequent holding tanks introduces pathogens back into the product. This failure demonstrates how compromised prerequisite programs directly undermine the effectiveness of a validated process control plan.

12. (A) 3-2-5-1-4
Establishing a food safety plan requires completing five preliminary tasks in a defined sequence. First, a multidisciplinary team is assembled. Next, the product's characteristics and its intended consumer use are described. A process flow diagram is then constructed to map all manufacturing steps, which must subsequently be verified on-site for accuracy.

13. (A) Calibration of continuous temperature sensors at a CCP
While facility-wide equipment calibration is a prerequisite program, calibrating monitoring instruments specifically located at a designated critical control point is an intrinsic component of the safety plan's verification procedures. In contrast, supplier approvals, waste disposal systems, and general chemical sanitation schedules represent foundational practices that support the entire manufacturing environment.

14. (C) A CCP is a specific step essential to prevent, eliminate, or reduce a food safety hazard to an acceptable level.
A critical control point is a specific operational step where control can be applied to prevent, eliminate, or reduce an identified food safety hazard to a scientifically acceptable level. Other control points represent steps where quality parameters or non-critical hygiene factors are managed, but where failure does not directly cause an unmitigated consumer health risk.

15. (D) ISO 22000 - World Trade Organization (WTO)
The International Organization for Standardization developed the standard to harmonize global food safety management requirements, rather than the World Trade Organization. The other frameworks are correctly paired with their primary authorizing bodies, representing international consensus on laboratory procedures, agricultural methods, and microbiological safety principles developed by their respective agencies.

16. (C) A biological, chemical, or physical agent in food with potential to cause adverse health effects.
Within food safety frameworks, a hazard is defined as a biological, chemical, or physical agent in food, or a condition of food, that has the potential to cause illness or injury. This definition excludes sensory quality defects, financial risks, or general processing deviations that do not directly threaten consumer public health.

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17. (D) Statement I is incorrect but Statement II is correct.
The process flow diagram must comprehensively cover all stages of the manufacturing operation, from receiving raw materials to final packaging and distribution, rather than focusing solely on critical control points. This completed diagram must then be verified on-site during actual processing hours to ensure it accurately reflects real operational practices.

18. (A) 1, 2, and 3 only
Conducting a hazard analysis involves identifying potential biological, chemical, and physical hazards, followed by evaluating their severity and likelihood of occurrence to determine significance. Establishing maximum residue

management of the studies, reporting findings directly to facility management.

80. (C) That the item is properly labeled with expiry and logged for custody tracking.
Proper management of test and reference items requires that all incoming standards are immediately labeled with their identity, concentration, expiry date, and storage instructions. Technicians must document custody and usage logs to ensure full traceability and prevent chemical degradation, supporting the scientific validity of the analytical study.

81. (A) P-IV, Q-I, R-III, S-II
Good Laboratory Practice terms are defined by their functional roles. Operating procedures describe routine laboratory tasks. The master schedule compiles all studies to manage workload. Raw data comprises the original observations made during experiments, and archives serve as secure, controlled areas for the long-term storage of all study documents.

82. (D) Only the final printed report must be archived, allowing raw analytical data to be discarded to save space.
Archiving rules require the long-term retention of all raw experimental data, instrument outputs, study plans, and specimens, alongside the final report. Discarding raw analytical data to conserve archive space is a critical violation, as the raw data is essential for reconstructing the study and verifying the final report.

83. (A) Logged into a tracking system, assigned a unique code, and stored under proper conditions to prevent degradation.
Receiving test samples under laboratory standards requires logging each sample immediately upon arrival, assigning a unique identification code, and placing it under controlled environmental storage. These procedures prevent cross-contamination, sample degradation, and labeling errors, maintaining sample integrity throughout the testing process.

84. (A) Both A and R are true and R is the correct explanation of A.
The independence of the quality assurance unit is a fundamental requirement of laboratory standards. Separation from study personnel ensures that internal audits and inspections remain objective and free from conflicts of interest, allowing the quality unit to evaluate study compliance without pressure from operational or scientific management.

85. (A) Study Director - Approving the study plan and taking ultimate responsibility for execution
The Study Director is the single point of control for the study, holding responsibility for approving the plan and ensuring its technical execution. The quality unit audits operations, the archivist manages long-term records, and facility management is responsible for overall laboratory resources rather than individual study execution.

86. (B) It causes a deviation that compromises study integrity and may invalidate the entire analytical dataset.
Using expired chemical reagents without documenting the event violates laboratory quality protocols. This practice introduces scientific uncertainty regarding reagent strength and reactivity, causing a deviation that compromises study integrity and can lead to the invalidation of the entire analytical dataset during regulatory review.

87. (B) Raise a major non-conformance, as GLP mandates regular equipment calibration with records to ensure accuracy.
Equipment calibration and maintenance are essential laboratory requirements. Operating analytical instruments like chromatography systems without recent calibration records represents a major non-conformance, as there is no documented evidence to verify the accuracy of the measurements, which compromises the reliability of all pesticide testing data.

88. (C) Writing and signing the final study report to verify its scientific conclusion.
The Study Director is responsible for writing and signing the final report, verifying its scientific findings. The quality assurance unit must not write or sign this report; their function is restricted to auditing the document to verify that it accurately reflects the raw experimental data.

89. (D) To ensure the generation of high-quality, reliable, and mutually acceptable test data.
Implementing laboratory standards is designed to ensure the generation of high-quality, reliable, and mutually acceptable test data across international borders. This consistency allows regulatory bodies to trust and accept toxicological studies

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sifting directly control biological, physical, and chemical safety hazards, monitoring cosmetic appearance does not manage a food safety hazard and cannot be classified as a critical control point.

29. (A) Identify all potential biological, chemical, and physical hazards for each process step.
The initial phase of conducting a systematic hazard analysis requires identifying every potential biological, chemical, or physical hazard that could reasonably occur at each process step. Establishing corrective actions, applying decision trees, or validating shelf stability are subsequent steps that cannot occur until all potential hazards have been thoroughly identified.

30. (C) Agricultural antibiotic residue - Physical hazard
Veterinary drug and agricultural antibiotic residues are chemical substances rather than physical foreign objects. Biological hazards include viral pathogens like Norovirus, chemical hazards encompass natural toxins like histamine in fish, and physical hazards consist of extraneous solid objects like bone fragments in meat products that can cause injury.

31. (D) A maximum or minimum value to which a safety parameter must be controlled at a CCP.
A critical limit is a scientifically validated value that separates acceptable processing conditions from unacceptable, unsafe levels at a critical control point. These limits establish clear boundaries for operational parameters like time, temperature, pH, or moisture, ensuring that targeted food safety hazards are effectively controlled during manufacturing.

32. (A) Both Statement I and Statement II are correct.
Continuous monitoring at a critical control point is highly preferred because it provides an uninterrupted record of the process, immediately capturing any deviations. When continuous monitoring is not technically feasible, the frequency of manual or periodic measurements must be statistically sufficient to verify that the step remains in complete control.

33. (A) 1, 2, and 3 only
When a deviation occurs, corrective actions must isolate affected product, identify the root cause, and restore process control. Reclassifying a critical control point to a generic control point is an invalid practice that violates safety principles, as critical control points must remain established to manage significant consumer health hazards.

34. (D) Critical limits must be scientifically based, derived from regulatory standards or research studies.
Critical limits must be established based on rigorous scientific evidence, peer-reviewed literature, or established regulatory standards. Relying on arbitrary estimates, subjective sensory judgments, or uniform facility-wide limits is a major food safety violation, as each critical control point requires specific, measurable boundaries tailored to control its targeted hazard.

35. (A) Divert milk flow, segregate the affected product, and adjust heating.
A temperature drop below the critical limit at a pasteurization step represents a critical control point deviation. The immediate protocol requires automatic diversion of the underprocessed milk flow, segregation of all affected products to prevent distribution, and adjustment of the heating system to restore compliant processing temperatures.

36. (A) P-III, Q-I, R-IV, S-II
The seven principles follow a specific sequence. Setting critical control points is Principle Two, establishing monitoring procedures represents Principle Four, formulating corrective actions is Principle Five, and establishing comprehensive documentation and record-keeping procedures forms Principle Seven. This structure provides a systematic approach for maintaining food safety.

37. (A) Monitoring involves complex, multi-day biological tests to verify destruction.
Monitoring at a critical control point must provide rapid, real-time results to allow immediate corrective actions if a deviation occurs. Complex biological or microbiological tests that require several days for incubation are entirely unsuitable for routine monitoring, as they cannot prevent non-compliant products from leaving the facility.

38. (D) Performing calibration to support monitoring
Weekly testing of a thermometer in ice slurry and boiling water represents calibration, which ensures that monitoring instruments remain accurate and reliable. Calibration supports the monitoring process by verifying that temperature measurements are correct, ensuring that any

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recorded deviations or compliant readings reflect true processing conditions.

39. (A) Both A and R are true and R is the correct explanation of A.
Critical limits must be specific, measurable, and rapidly observable parameters to ensure continuous process control. These characteristics enable operators to monitor conditions in real time and take immediate corrective action during a deviation, preventing contaminated or underprocessed food from being packaged, distributed, or consumed.

40. (C) pH level - Standard benchtop pH meter or inline pH probe
Monitoring pH using a standard benchtop meter or inline probe provides rapid, precise, and objective measurements suitable for verifying critical limits at a control point. In contrast, pathogen testing is too slow for monitoring, while stopwatch time-tracking and water activity testing are not matched with appropriate real-time continuous tools.

41. (D) Control is lost at the CCP, triggering mandatory corrective actions.
When a metal detector fails to reject a test piece that meets or exceeds the critical limit threshold, control at that critical control point is lost. This failure constitutes a deviation, requiring the immediate implementation of documented corrective actions to isolate the product and repair the machine.

42. (A) 1-2-4-3
The corrective action protocol requires a logical, sequential response to a process deviation. First, the deviation is identified and documented. Next, the affected product is isolated and held. The process cause is then corrected to restore control, followed by determining the final disposition of the held product.

43. (B) Results of a 48-hour Salmonella culture test
Critical limits must be monitored using parameters that yield rapid results to facilitate immediate corrective action. A forty-eight-hour microbiological culture test is unsuitable as a critical limit because its significant time delay prevents real-time process control, allowing potentially contaminated products to leave the manufacturing facility before results are known.

44. (B) To establish operational accountability and verify that the monitoring occurred on time.
Requiring the initials or signature of the individual performing the monitoring tasks establishes strict operational accountability. This practice verifies that the monitoring occurred at the scheduled frequency and was executed by trained, authorized personnel, creating a reliable, traceable record essential for regulatory compliance and safety verification.

45. (A) Preventive Action - Releasing product that barely missed the critical limit
Releasing a product that has deviated from established critical limits is a major food safety violation, not a preventive action. Corrective actions react to deviations by isolating non-compliant products, whereas preventive actions proactively identify and eliminate root causes to prevent potential hazards from occurring in the first place.

46. (C) Obtaining evidence that the elements of the HACCP plan are effective and capable of controlling the identified hazards.
Validation is a scientific process focused on gathering objective evidence to prove that the food safety plan's elements, such as critical limits and monitoring frequencies, are effective and capable of controlling identified hazards. This differs from routine verification, which ensures that the established plan is being followed correctly.

47. (A) Both Statement I and Statement II are correct.
Validation must be performed during plan design or when process modifications occur to ensure the scientific adequacy of the safety limits. Routine verification represents ongoing activities, including instrument calibration and record reviews, conducted to confirm that the established safety plan is being executed in daily operations.

48. (A) 1, 2, and 4 only
Food safety documentation under Principle Seven requires maintaining the hazard analysis summary, critical control point monitoring records, and corrective action logs. These documents directly support safety verification, whereas employee financial payroll records are administrative and fall outside the scope of food safety management system documentation.

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49. (B) An independent supervisor reviewing and signing the daily CCP monitoring logs.
Regular review and signing of monitoring logs by a supervisor represents a core verification activity. This process confirms that monitoring is conducted on schedule and that critical limits are maintained, whereas scientific literature reviews represent validation, and designing packaging or upgrading software does not assess plan execution.

50. (D) Verification of the HACCP plan's efficacy
Reviewing customer complaint logs serves as a method of verification, allowing the food safety team to assess whether the active safety plan is functioning effectively in the field. A spike in complaints reveals underlying process failures, prompting a reassessment of critical limits to ensure hazards are controlled.

51. (A) P-III, Q-IV, R-I, S-II
Document types serve distinct purposes in a safety system. Scientific challenge studies provide supporting validation documentation. Hourly temperature charts function as operational monitoring records. Logs detailing batch disposal represent corrective action records, and internal system audit reports serve as verification records of the overall food safety plan.

52. (C) Validation is a daily activity performed by the line operator during production.`
Validation is not a routine daily task performed by line operators. Instead, validation is a high-level scientific assessment conducted during plan development or process changes to prove limits are effective. In contrast, daily operator activities consist of routine monitoring and verification, such as logging temperatures or checking sensors.

53. (A) HACCP plan validation
Inoculating product with a non-pathogenic surrogate to measure microbial survival under specific thermal parameters is a scientific challenge study. This study provides empirical evidence that the process effectively eliminates the target pathogen, serving as a classic example of validating the critical limits established within a food safety plan.

54. (A) Both A and R are true and R is the correct explanation of A.
Comprehensive record-keeping is critical to a food safety system. Documented evidence of monitoring and corrective actions verifies that critical limits were maintained, establishing a historical safety record. These records are essential for demonstrating regulatory compliance and defending the facility during audits or foodborne illness investigations.

55. (B) Thermometer calibration - Ensuring monitoring data remains accurate
Calibrating monitoring instruments, such as thermometers, ensures that the measurements recorded during processing are accurate and reliable. This calibration is a core verification activity that prevents false readings, thereby ensuring that operators can accurately determine whether a process step is operating within established critical limits.

56. (C) The facility will receive a major non-conformance citation for lack of documented control evidence.
In food safety audits, undocumented monitoring is considered undone. Failing to record critical limit measurements, even if physical parameters were met, results in a major non-conformance citation. Auditors require physical or digital evidence of compliance to verify that the safety plan is active and functioning correctly.

57. (D) Request scientific validation data proving 65°C for 10 seconds achieves necessary pathogen reduction.
Auditors must verify that all critical limits are scientifically valid. If a facility establishes a lower cooking temperature to reduce utility costs, they must provide scientific evidence, such as peer-reviewed publications or thermal death studies, proving the parameters achieve the required pathogen reduction to ensure public health safety.

58. (A) The marketing budget for the final food product
Food safety records are strictly limited to technical documents that verify process control and safety plan design. While team meeting minutes, calibration logs, and decision trees directly support safety verification, commercial documents such as marketing or advertising budgets contain no safety-related data and are excluded from safety files.

59. (B) To confirm the system operates according to plan and is scientifically sound.
The primary objective of the sixth principle is to confirm that the food safety system is operating in

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compliance with the established plan and remains scientifically sound. Verification activities, such as record reviews and calibration, assess whether the safety measures are being executed correctly during daily production.

60. (B) Validation - Daily review of temperature logs
Daily review of temperature logs is a routine verification activity, not a validation activity. Validation focuses on proving that established critical limits are scientifically capable of controlling hazards, whereas verification involves ongoing, daily operational checks to confirm that the validated plan is being followed.

61. (A) The Codex Alimentarius Commission
The General Principles of Food Hygiene, which outline global standards for Good Manufacturing Practices, were established and are maintained by the Codex Alimentarius Commission. This joint body of the Food and Agriculture Organization and the World Health Organization provides the international benchmark for food hygiene standards.

62. (C) Statement I is correct but Statement II is incorrect.
Good manufacturing standards require a linear, logical product flow from raw material receiving to finished product packaging to prevent cross-contamination. Conversely, drainage systems must flow from clean areas toward contaminated raw areas to prevent wastewater and airborne pathogens from entering sterile processing zones.

63. (D) 1, 2, 3, and 4
Personnel hygiene standards require workers to wear clean protective clothing, remove jewelry that could harbor pathogens or drop into products, report transmissible illnesses to management, and restrict food consumption to designated non-processing areas. These practices prevent workers from introducing biological or physical hazards into the manufacturing line.

64. (C) Equipment must be designed for easy cleaning and inspection using smooth, non-corrosive, and non-toxic materials.
Sanitary equipment design requires smooth, non-corrosive, and non-toxic direct contact surfaces that are free of deep crevices, sharp corners, or dead ends. This design allows for complete cleaning, disinfection, and inspection, preventing food residues from accumulating and forming microbial niches or biofilms.

65. (B) Personnel zoning and cross-contamination control
Slicing ready-to-eat meats using employees who handle raw poultry without changing protective equipment represents a failure in physical zoning. Good manufacturing practices require strict separation of raw and finished product areas, including dedicated clothing and footwear, to prevent transferring environmental pathogens like Listeria to cooked products.

66. (A) P-IV, Q-I, R-III, S-II
Good manufacturing practices dictate specific parameters. Facility layouts require physical separation between raw and cooked processing zones. Sanitary facilities must provide compliant handwashing stations. Maintenance programs prevent machinery breakdowns, and personnel hygiene protocols require daily hygiene practices, such as proper showering and wearing clean uniforms.

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67. (A) Handwashing stations should be combined with equipment washing sinks to save space.
Combining handwashing stations with equipment washing sinks violates good manufacturing standards. Handwashing sinks must be dedicated solely to personal hygiene to prevent cross-contamination. Sinks must be located near processing entrances, equipped with non-hand-operable controls, and provide single-use drying towels to ensure proper sanitary conditions.

68. (C) Smooth, light, washable, and waterproof epoxy panels
Processing room walls must be constructed of smooth, durable, light-colored, waterproof, and non-absorbent materials, such as food-grade epoxy panels. These materials withstand frequent chemical washing and sanitation without corroding, cracking, or absorbing moisture, preventing the growth of fungal or bacterial pathogens in the environment.

69. (A) Both A and R are true and R is the correct explanation of A.
Coving wall-to-floor junctions eliminates sharp ninety-degree angles, creating a curved surface that prevents dirt, debris, and water from accumulating. This architectural detail is a critical manufacturing standard, as it allows cleaning

solutions to reach junctions easily and facilitates rapid, effective sanitation.

70. (D) Low-risk area - Packaging of commercially sterile, sealed metal cans
Hygiene zones are classified based on the product's vulnerability to contamination. Packaging commercially sterile, hermetically sealed metal cans is a low-risk operation because the product is protected from environmental pathogens, whereas slicing ready-to-eat meats or handling raw ingredients represents higher-risk activities requiring stricter environmental controls.

71. (B) Moisture buildup will promote mold growth and contaminate the open product via dripping condensation.
Inadequate ventilation causes steam to accumulate on ceilings, forming heavy condensation. This persistent moisture promotes fungal and mold growth on overhead structural elements, creating a hazard where contaminated droplets can fall directly into open food lines, introducing microbiological pathogens to the product.

72. (C) 3-2-4-1
Gowning before entering high-care processing areas requires a specific sanitary sequence. Workers first change into dedicated footwear to prevent bringing floor contaminants inside. Next, they contain hair under a hairnet, don a clean protective overall, and finally wash and sanitize their hands to ensure no contaminants remain.

73. (D) Galvanized iron
Galvanized iron is unsuitable for direct food contact because it is highly susceptible to corrosion from acidic foods and chemical sanitizers. Good manufacturing practices require non-corrosive, non-toxic, and non-absorbent materials like stainless steel, high-density polyethylene, or food-grade silicone to prevent chemical contamination.

74. (A) To ensure products are consistently produced according to safety and quality standards.
Good Manufacturing Practices establish the operational guidelines necessary to ensure that food products are consistently manufactured in a safe, sanitary, and high-quality environment. These guidelines cover facility design, equipment maintenance, and personnel hygiene, providing a consistent operational framework that supports the safety of the entire supply chain.

75. (B) Employees wearing visible bandages without gloves over them
Allowing employees to work with visible hand bandages uncovered by waterproof gloves is a serious manufacturing practice violation. Good manufacturing standards require all cuts or bandages on food handlers to be fully covered with a water-resistant, secure glove to prevent biological contamination of food-contact surfaces.

76. (B) The organization and conditions under which non-clinical safety studies are planned, run, and reported.
Good Laboratory Practices represent a quality system regulating the organization, operational conditions, and documentation under which non-clinical environmental and health safety studies are planned, performed, monitored, and reported. This system ensures the generation of high-quality, reproducible scientific data for regulatory assessments, excluding financial auditing or clinical testing.

77. (C) Statement I is correct but Statement II is incorrect.
The Study Director holds ultimate, single-point responsibility for the technical execution, scientific validity, and reporting of a non-clinical study. The Quality Assurance Unit must remain independent of the study's execution and direct management, auditing laboratory operations and checking protocols without participating in experimental procedures.

78. (A) 1, 2, and 4 only
Good Laboratory Practice regulations require a comprehensive quality system comprising standardized operating procedures, an independent quality assurance unit, and a master schedule to track study progress. Conversely, consumer marketing data has no safety or scientific relevance and is excluded from laboratory compliance audits and facility-level safety studies.

79. (D) The QAU is an independent body that monitors the study to ensure compliance with all GLP principles.
The Quality Assurance Unit functions as an independent monitoring body within a compliant laboratory, responsible for auditing studies, facilities, and procedures. To maintain objectivity, this unit must remain completely separate from the design, technical execution, and scientific

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limits is a regulatory standard-setting activity performed by government authorities, rather than an operational step executed during a facility's internal safety analysis.

19. (A) It is a logical sequence of questions used to determine if a specific process step is a CCP.
A decision tree is a structured, logical tool comprising a sequence of specific questions applied to each step where a significant hazard has been identified. This tool assists food safety teams in objectively determining whether a process step is a critical control point, preventing subjective designations or unnecessary operational complexity.

20. (C) Critical Control Point (CCP)
The thermal processing step in commercial canning is specifically designed to destroy highly heat-resistant spores of Clostridium botulinum. Because this step is the last point in the process capable of eliminating this significant biological hazard, applying standard decision-tree logic classifies it as a critical control point essential for ensuring consumer safety.

21. (A) P-IV, Q-I, R-II, S-III
Food safety hazards are categorized by their nature. Biological hazards include pathogens such as Listeria monocytogenes. Chemical hazards encompass naturally occurring toxins like aflatoxins. Physical hazards consist of extraneous matter like glass fragments that cause injury. Radiological hazards involve radioactive isotopes, such as Cesium-137, which can contaminate crops or soil.

22. (D) Every step in a food manufacturing process must eventually be designated as a CCP to ensure total safety.
Designating every manufacturing step as a critical control point dilutes the focus of the safety plan, making it unmanageable and ineffective. Critical control points are limited to specific, essential locations where targeted control measures can prevent, eliminate, or reduce significant hazards, while other steps are managed through standard prerequisite programs.

23. (B) Low severity, low likelihood; may be managed via PRPs rather than a CCP.
Hazards characterized by both low severity and low likelihood of occurrence do not pose a significant risk to consumer food safety. Instead of establishing a critical control point, which requires intensive monitoring and critical limits, these minor risks are effectively controlled through foundational prerequisite programs like allergen control and storage segregation.

24. (A) Both A and R are true and R is the correct explanation of A.
End-of-line metal detectors are typically classified as critical control points because they act as the final preventive step in the manufacturing process. This specific location is capable of detecting, rejecting, and thereby eliminating physical metal contamination before the finished food products are sealed and distributed to the public.

25. (D) Staphylococcus enterotoxin - Biological hazard from poor human hygiene
Staphylococcus enterotoxin is a biological hazard produced by bacteria commonly carried on human skin and noses, often introduced to food through poor personnel hygiene. Lead is a chemical hazard rather than biological, patulin is a chemical mycotoxin, and wooden splinters represent a physical hazard rather than a chemical contaminant.

26. (A) A potential hazard pathway is missed during the formal hazard analysis.
Using an inaccurate, outdated process flow diagram that omits new plumbing or bypasses prevents the safety team from analyzing every physical step in the manufacturing line. This omission introduces a vulnerability, as potential biological, chemical, or physical contamination pathways occurring at that specific unmapped bypass step will go completely unaddressed.

27. (B) The receiving step is not a CCP since a later cooking step is designed to eliminate Salmonella.
Under systematic hazard analysis guidelines, a step is not designated as a critical control point if a subsequent processing step is specifically designed to eliminate or reduce the identified hazard to safe levels. Because cooking chicken represents a later step that destroys pathogens, raw receiving is managed via prerequisite programs.

28. (B) Checking the visual crust color of the bread for consumer appeal.
Visual attributes like crust color represent subjective sensory quality parameters rather than critical food safety factors. While baking temperature, metal detection, and ingredient

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conducted in other countries, reducing the need for redundant testing and streamlining international food trade.

90. (A) Final report - A marketing summary of product safety for consumers
The final report of a laboratory study is a comprehensive scientific document detailing the study plan, analytical methodologies, raw data, and statistical conclusions for regulatory review. It is not a simplified marketing summary designed for consumer use, which lacks the technical details required by laboratory standards.

91. (B) Farm practices ensuring safe, high-quality crop production and environmental sustainability.
Good Agricultural Practices establish guidelines for farm operations to ensure the production of safe, high-quality crops while maintaining environmental sustainability. These practices target pre-harvest and harvest stages to prevent contamination of agricultural commodities, differing from post-harvest food processing, retail distribution, or laboratory drug testing procedures.

92. (C) Statement I is correct but Statement II is incorrect.
The pre-harvest interval is the legally mandated minimum time required between the final pesticide application and crop harvest, allowing chemical residues to degrade to safe levels. Harvesting crops prior to this interval does not guarantee zero residues; rather, it increases the risk of exceeding maximum residue limits.

93. (B) 1, 3, and 4 only
Safe agricultural water management requires monitoring water for microbial pathogens, protecting water sources from livestock runoff, and logging test results. Using untreated surface water to dilute pesticides close to harvest violates agricultural guidelines, as it can directly introduce biological contamination to the edible portion of crops.

94. (C) Packing equipment and storage containers must be regularly sanitized to prevent microbial cross-contamination.
Post-harvest handling requires regular cleaning and sanitation of all packing equipment, tools, and storage bins. This maintenance prevents microbial cross-contamination, ensuring that fresh produce is protected from environmental pathogens after harvest. Conversely, slow cooling, washing with untreated surface water, or storing directly on soil violates agricultural standards.

95. (D) Agricultural water quality and risk assessment
The introduction of pathogens like Escherichia coli to crops via overhead sprinklers linked to upstream livestock runoff represents a failure in water quality risk assessment. Agricultural standards require regular water testing and protective buffers to ensure irrigation water is free from fecal contamination before application to fresh produce.

96. (A) P-II, Q-III, R-I, S-IV
Agricultural inputs introduce specific safety risks if mismanaged. Raw manure contains fecal pathogens like Salmonella. Surface irrigation water can carry pathogens from environmental runoff. Inappropriate pesticide use results in residues exceeding maximum limits, and harvesting machinery can introduce physical contaminants like metal shavings or lubricants to crops.

97. (B) Untreated human sewage sludge is recommended as an organic fertilizer for fresh produce.
Applying untreated human sewage sludge as fertilizer for fresh produce is strictly prohibited under agricultural standards due to the high risk of transmitting human pathogens. Safe soil amendments require composting manure under validated time and temperature conditions to destroy biological hazards before applying them to agricultural fields.

98. (D) Follow the instructions, application rates, and PHIs specified on the registered product label.
Compliant chemical application requires farmers to strictly follow the specific instructions, usage rates, and pre-harvest intervals printed on the registered product label. Deviating from these instructions by copying neighbors, doubling doses, or excessive dilution is a major safety violation that can lead to hazardous chemical residues on food.

99. (A) Both A and R are true and R is the correct explanation of A.
Traceability systems should begin at the farm level using agricultural records. Documenting plot numbers, crop varieties, agrochemical treatments, and harvest dates establishes a clear history. If contamination is detected downstream, these

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involves scraping, sweeping, or brushing away bulk organic debris. This step removes heavy soils mechanically, preventing them from neutralizing the chemical detergents applied in subsequent steps and optimizing the efficiency of the entire sanitation process.

120. (C) Birds - Small, perfectly round boreholes in wooden pallets
Perfectly round boreholes in wooden pallets are caused by wood-boring insects rather than birds. Bird infestations are characterized by droppings, nesting materials, feathers, and physical sightings near rafters. The other options correctly pair common pests with their typical signs of infestation, which are monitored during sanitation inspections.

121. (D) Traceability a product back to its immediate supplier and forward to its immediate customer.
The "one-up, one-down" principle requires a food business to trace the immediate supplier of their raw ingredients and identify the immediate customer of their finished products. This framework establishes continuous traceability across the supply chain, facilitating rapid target recalls without requiring individual facilities to map the entire global market.

122. (C) Statement I is correct but Statement II is incorrect.
Internal traceability involves tracking raw ingredients as they move through different processing stages to become finished product lots within a single facility. Conversely, external traceability must rely on documented lot codes and transaction records shared between supply chain partners rather than verbal agreements, ensuring reliable chain-of-custody tracking.

123. (B) 1, 2, and 3 only
A robust traceability system requires unique lot identification, documented links between raw materials and finished goods, and rapid retrieval systems to access tracking data during food safety events. While packaging design can support commercial marketing, it has no impact on the technical capability to track and trace products.

124. (B) It identifies when, where, and from what ingredients a batch was made, confining the recall scope.
Lot coding is essential because it links a finished product to its specific production date, manufacturing line, and ingredient lots. If a contamination issue occurs, this identifier allows the facility to isolate and recall only the affected batch, minimizing public safety risks and preventing the unnecessary disposal of compliant products.

125. (A) Query the database to identify and block all intermediate or finished products containing that cumin lot.
Upon receiving notification of a contaminated ingredient, the manufacturer must query their tracking database to identify all finished products containing that specific lot. The system allows the facility to place an immediate electronic hold on these items, preventing their accidental shipment and facilitating targeted recall actions.

126. (A) P-IV, Q-III, R-I, S-II
Traceability components are defined by their functions. Tracing involves identifying the source of raw ingredients. Tracking identifies the downstream destinations of finished goods. Lot codes are unique identifiers for individual production runs, and batch records detail the ingredients and processing parameters used during a specific manufacturing run.

127. (D) ERP systems eliminate all human errors associated with physically labeling pallets in the warehouse.
While electronic planning systems significantly improve traceability and allow for product holds, they cannot eliminate human errors associated with physical operations, such as applying incorrect labels to pallets. System data integrity remains dependent on the accuracy of the manual inputs and physical scans performed by workers.

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128. (C) "OJ-23295-L2-0830" (Product-Date-Line-Time Code)
A highly functional lot code format must incorporate specific, structured data, such as product type, Julian date, production line, and manufacturing time. This detailed code provides immediate internal traceability, allowing the facility to isolate narrow production windows if a deviation occurs, rather than recalling an entire day's output.

129. (A) Both A and R are true and R is the correct explanation of A.
Traceability systems do not physically prevent or eliminate contamination hazards during food

food lines introduces a critical risk of chemical contamination.

110. (C) The formation of a biofilm that shields bacteria from the sanitizer.
Inadequate initial cleaning allows organic residues to build up, creating a structured matrix known as a biofilm on equipment surfaces. This biofilm physically shields bacteria from chemical sanitizers like chlorine, preventing disinfection. Resolving this issue requires mechanical scrubbing and specialized detergents to disrupt the film before sanitizing.

111. (A) P-II, Q-III, R-I, S-IV
Sanitizing chemicals have unique characteristics. Chlorine is inexpensive and broad-spectrum but highly corrosive. Quaternary ammonium compounds leave a residual film, making them suitable for environmental surfaces. Peracetic acid is highly effective against biofilms and degrades safely, while iodine stains surfaces and changes color to indicate active chemical strength.

112. (C) CIP systems eliminate the need for any chemical sanitizers by relying entirely on high-pressure cold water.
Clean-in-place systems circulate chemical detergents and sanitizers through piping to clean enclosed equipment. Relying solely on high-pressure cold water is incorrect, as chemical reactions, temperature, and turbulence are required to remove organic soils and disinfect lines. Poor piping designs, such as dead ends, can create unsanitary shadows.

113. (B) Dismantling the blade and carriage to clean and sanitize all hidden food contact surfaces.
Meat slicers contain complex moving parts and recessed crevices where organic residues can accumulate and harbor pathogens. Cleaning these machines requires dismantling the blade and carriage to expose and disinfect all direct food-contact surfaces, preventing the formation of biological niches that could contaminate processed foods.

114. (A) Both A and R are true and R is the correct explanation of A.
Cleaning must always precede sanitizing because sanitizers cannot penetrate organic soils. Food residues, such as proteins and fats, chemically react with and neutralize sanitizing agents, rendering them ineffective against remaining microorganisms. Removing these soils beforehand ensures that the sanitizer can directly contact and destroy surface pathogens.

115. (A) Time, Action (Mechanical), Concentration (Chemical), Temperature
The four core variables that dictate cleaning efficacy are represented by the TACT acronym. These comprise the contact time of the cleaning agent, the mechanical action applied, the chemical concentration of the detergent, and the temperature of the solution. Balancing these four factors is essential for removing organic soils effectively.

116. (C) Hard water minerals bind detergent surfactants, decreasing efficacy and forming mineral scale.
High concentrations of calcium and magnesium in hard water chemically bind with detergent surfactants, reducing their foaming and cleaning capacity. This chemical interference results in poor soil removal and leads to the formation of mineral scale on equipment surfaces, which can harbor bacterial pathogens and cause equipment damage.

117. (A) This is a critical violation; toxic baits are prohibited in processing areas due to chemical contamination risk.
Placing toxic rodent bait inside a food processing area is a critical safety violation. Regulatory guidelines prohibit the use of toxic chemicals inside processing environments due to the risk of accidental chemical contamination of food products. Internal pest control must rely on non-toxic traps, while toxic baits are restricted to exterior perimeters.

118. (D) Wiping surfaces with untreated, recycled graywater.
Using untreated, recycled graywater to wipe food contact surfaces violates basic food hygiene standards. This water can introduce biological and chemical pathogens to clean equipment, causing widespread contamination. Sanitizing must utilize approved methods, such as hot water or validated concentrations of chemical agents like chlorine or peracetic acid.

119. (B) Dry clean / gross soil removal (sweeping, scraping)
The initial phase of a standard cleaning and disinfection program is dry cleaning, which

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farm records allow investigators to rapidly trace the product back to its specific source, minimizing public risk.

100. (C) Potable water - Used for handwashing and post-harvest produce washing
Post-harvest tasks that contact edible crops directly, such as handwashing and final produce washing, must utilize potable water to prevent biological contamination. Untreated surface water or pond water is unsuitable for these critical steps, as it can introduce pathogens to ready-to-eat produce immediately before packaging.

101. (A) The spinach will likely contain pesticide residues exceeding the legal maximum residue limit.
Harvesting crops before the pre-harvest interval has elapsed is a critical violation of chemical safety guidelines. This premature harvest does not allow sufficient time for the applied insecticide to degrade, resulting in spinach that likely contains active chemical residues exceeding the legally established maximum residue limits.

102. (A) 1-2-4-3
Pesticide management requires a precise, sequential approach. First, the pest must be identified. An approved, registered chemical is then selected for that crop. Next, the pesticide is applied using calibrated equipment and proper protective gear, followed by observing the mandatory pre-harvest interval before harvesting the crop.

103. (B) Transporting fresh produce in open trucks alongside live poultry.
Transporting fresh produce in open trucks alongside live poultry is an unsafe practice that violates agricultural standards. Poultry carries pathogens such as Salmonella and Campylobacter that can contaminate the adjacent produce. Safe handling requires physical separation, temperature control, and culling damaged items during the packing process.

104. (C) To produce safe food by minimizing hazards at pre-harvest and harvest stages.
The primary objective of Good Agricultural Practices is to ensure the production of safe, high-quality food by minimizing biological, chemical, and physical hazards at the pre-harvest and harvest stages. This preventive approach targets potential contamination sources in the field, protecting the safety of the supply chain before processing begins.

105. (D) Using potable water for flume washing - Prevents heavy metal uptake by plant roots
Flume washing occurs post-harvest and is designed to clean the crop surface and prevent microbial cross-contamination. This step cannot prevent heavy metal uptake by plant roots, which occurs during the pre-harvest growth phase. Heavy metal uptake must be managed by analyzing and controlling the agricultural soil and irrigation water.

106. (A) Cleaning removes visible organic soil, while sanitation reduces microorganisms to safe levels.
Cleaning and sanitation serve distinct, sequential functions in hygiene programs. Cleaning involves the physical removal of visible organic soil, grease, and debris using water and detergents. Sanitation, or disinfection, is the subsequent application of heat or chemicals to reduce remaining microscopic pathogens to scientifically safe levels.

107. (D) Statement I is incorrect but Statement II is correct.
Sanitizing agents are heavily neutralized by organic matter; they cannot disinfect soiled surfaces. Surfaces must be thoroughly cleaned, scrubbed, and rinsed to remove proteins and fats before a sanitizer can contact and destroy remaining microorganisms. This sequence ensures the chemical efficacy of the disinfection program.

108. (D) 1, 2, 3, and 4
Standard sanitary operating procedures must address eight key sanitation areas. These areas include verifying water safety, preventing cross-contamination, maintaining handwashing and toilet facilities, and protecting food from adulterants like lubricants or condensation. Addressing these areas provides a comprehensive framework for facility-wide hygiene and sanitary control.

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109. (A) The facility perimeter must prevent pest entry using mesh screens, air curtains, and bait stations.
A compliant pest control program focuses on exclusion and prevention by sealing building perimeters, installing fine mesh screens on windows, utilizing air curtains, and placing secure bait stations externally. Openly placing toxic baits or spraying liquid pesticides near open

processing; they are information management tools. However, they are vital for food safety because they enable the rapid identification, tracking, and removal of contaminated products from distribution, minimizing the public health impact of a safety event.

130. (D) Internal traceability - Tracking an ingredient from the receiving dock to its inclusion in a finished product lot
Internal traceability involves tracking the movement and formulation of ingredients as they progress from the receiving dock through intermediate processing steps to the finished product lot. Forward tracking identifies downstream customers, backward tracing identifies raw material suppliers, and external traceability covers transactions between independent supply chain partners.

131. (A) It causes a loss of trace resolution, forcing the recall of the entire combined pallet if one batch is compromised.
Combining different production lots onto a single pallet under a generic barcode destroys trace resolution. If a safety issue is discovered in one lot, the lack of distinct tracking data forces the facility to recall all combined lots on that pallet, increasing the financial and operational scale of the recall.

132. (A) 1-2-4-3 → Wait, options are: (A) 1-2-3-4.
Conducting a backward trace requires a precise, logical sequence. First, the lot code of the defective finished product is identified. The corresponding batch production record is then reviewed, followed by identifying the specific raw material lots used. Finally, receiving logs are audited to trace those materials back to their suppliers.

133. (A) The home addresses of the line workers involved in production.
Production batch records are designed to track technical data essential for product safety and traceability, such as ingredient lot numbers, quantities, operator signatures, and process times. Personal details like employee home addresses have no technical relevance to food safety and are excluded from standard manufacturing documentation.

134. (D) It provides real-time traceability data, accelerating recall and mass balance calculations.
Electronic inventory systems provide real-time data access, allowing safety teams to execute trace exercises and mass balance calculations within minutes. In contrast, paper-based tracking requires manual filing reviews that slow response times during a safety emergency, though neither system replaces physical critical control point monitoring or hazard controls.

135. (B) Final Consumer - Maintaining detailed logs of one-up, one-down data
Final consumers have no regulatory or operational obligation to maintain traceability logs. Traceability responsibilities are restricted to commercial businesses within the supply chain, including agricultural producers, food manufacturers, and logistics distributors, who must document transaction data to ensure public health and safety.

136. (C) Recalls involve safety violations and hazards, while withdrawals are for minor quality issues without legal action.
Recalls are initiated when a product violates safety standards or poses a health hazard, requiring removal from the market. Conversely, market withdrawals involve minor quality or aesthetic issues that do not violate regulations or pose health risks, allowing the company to retrieve the product without formal regulatory intervention.

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137. (C) Statement I is correct but Statement II is incorrect.
Class One recalls involve situations where there is a reasonable probability that consumption of the product will cause serious adverse health consequences or death. Conversely, Class Three recalls involve products that violate labeling rules or packaging standards but are highly unlikely to cause any adverse health consequences.

138. (D) 1, 2, 3, and 4
An effective recall plan must incorporate structured protocols. These include assembling a response team, identifying affected lots and their distribution pathways, notifying regulatory bodies and the public, and retrieving and destroying the product. Having these components in place ensures a rapid, organized response that protects public health.

CHAPTER 26

ISO Standards, Total Quality Management, Legal Aspects and Food Safety

1. Consider the following statements regarding the scope and applicability of ISO 22000:2018:

I. It is applicable to all organizations in the food and feed industries, regardless of size or sector.

II. It specifies requirements for a Food Safety Management System (FSMS) to enable an organization to consistently provide safe foods.

III. It can only be implemented by primary agricultural producers and not by food packaging manufacturers.

IV. It integrates the principles of the Hazard Analysis and Critical Control Point (HACCP) system developed by the Codex Alimentarius Commission.

Which of the above statements are correct?

(A) I, II and III
(B) I, II and IV
(C) II, III and IV
(D) I, III and IV

2. The ISO 22000 standard for Food Safety Management Systems was most recently revised and published in which of the following years?

(A) 2005
(B) 2012
(C) 2015
(D) 2018

3. Which of the following statements correctly describes the 'Context of the organization' as mandated by Clause 4 of ISO 22000:2018?

(A) It requires determining external and internal issues relevant to the organization's purpose and its FSMS objectives.
(B) It refers exclusively to analyzing the internal operational environment, including organizational culture, resources, and performance.
(C) It focuses solely on identifying and compiling statutory, regulatory, and legal requirements imposed by national food authorities.
(D) It serves as a voluntary assessment tool for large food enterprises to monitor global market dynamics and macro-economic impacts.

4. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R):

Assertion (A): ISO 22000:2018 requires an organization to identify and understand the needs and expectations of interested parties.

Reason (R): Relevant interested parties can impact the organization's ability to consistently provide safe food products and services that meet statutory and regulatory requirements.

(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

5. According to the vocabulary of ISO 22000:2018, how is 'Food Safety' formally defined?

(A) The guarantee that a food product will not cause any illness or physiological discomfort when it is consumed in normal quantities.
(B) The assurance that food will not cause adverse health effects when prepared and consumed according to its intended use.
(C) The complete absence of any biological, chemical, or physical hazards throughout all processing stages of the food product.
(D) The nutritional and dietary adequacy of a food product to satisfy human metabolic needs without producing toxic reactions.

6. Under the context of ISO 22000, which of the following is NOT typically considered an external issue affecting an organization's Food Safety Management System?

(A) Changes in national food safety legislation
(B) Emerging foodborne pathogens in the supply

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health consequences, such as minor labeling omissions or minor cosmetic packaging defects.

149. (A) To systematically examine if food safety activities comply with planned arrangements and standards.
The primary objective of a food safety audit is to systematically examine whether a facility's operational activities and safety records comply with its planned safety program and regulatory standards. This objective evaluation verifies that the safety management system is implemented effectively and is capable of controlling biological, chemical, and physical hazards.

150. (D) First-party audit - An audit conducted by a government regulatory inspector
An audit conducted by a government regulatory inspector represents a regulatory or compliance audit, not a first-party audit. First-party audits are internal evaluations conducted by a business on its own operations, second-party audits are executed by a company on its suppliers, and third-party audits are conducted by independent, accredited certification bodies.

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14. What is the most likely effect on a food business if it fails to accurately identify statutory and regulatory authorities as relevant interested parties?
(A) An accelerated path to ISO certification due to a reduced number of compliance audits.
(B) The immediate and mandatory withdrawal of all existing third-party supplier contracts.
(C) An FSMS that fails to ensure legal compliance, leading to potential penalties.
(D) An increased internal auditing performance caused by a narrower scope of system requirements.

15. Identify the correct pair among the following ISO 22000 terms and their focus areas:
(A) Top management - The leadership team whose primary role is restricted to personally conducting and documenting all internal system audits
(B) Interested party - Person or organization that can affect, be affected by, or perceive itself to be affected by a decision or activity
(C) Competence - The continuous and real-time monitoring of critical control points and action criteria to ensure absolute process compliance
(D) Outsource - An arrangement where an external provider is hired to execute activities that must be performed solely by internal staff members

16. Consider the following statements regarding Operational Planning and PRPs under ISO 22000:
I. Prerequisite programs (PRPs) are basic conditions and activities necessary to maintain a hygienic environment.
II. The selection of PRPs does not need to consider applicable statutory and regulatory requirements.
III. Hazard analysis must be conducted before categorizing control measures into OPRPs and CCPs.
IV. The food safety plan must include both the HACCP plan and the OPRP plan.
Which of the above statements are correct?
(A) I, II and III
(B) I, III and IV
(C) II, III and IV
(D) I, II and IV

17. Which clause of ISO 22000:2018 specifically addresses Leadership and commitment, including the establishment of the food safety policy?
(A) Clause 4
(B) Clause 5
(C) Clause 7
(D) Clause 8

18. Which of the following is a correct statement regarding the Food Safety Policy under ISO 22000?
(A) It must be established by the food safety team leader independently of top management.
(B) It is a confidential document that should not be communicated to external interested parties.
(C) It must commit to satisfy applicable food safety, statutory, and regulatory requirements.
(D) It only needs to be updated when the organization undergoes a major change in ownership.

19. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R):
Assertion (A): Top management must ensure that responsibilities and authorities for relevant roles are assigned, communicated, and understood within the organization.
Reason (R): Clear allocation of roles prevents duplication of work but has no direct impact on the effectiveness of the food safety management system.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

20. How does ISO 22000:2018 define an Operational Prerequisite Program (OPRP)?
(A) A strategic measure established by top executive leadership to monitor and evaluate employee attendance and daily shift performance.
(B) A specific process step at which control can be applied to prevent, eliminate, or reduce an identified food safety hazard to zero.
(C) The basic conditions and sanitary activities necessary to maintain a hygienic environment throughout the entire food supply chain.

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chain
(C) Organizational structure and allocation of roles
(D) Technological advancements in rapid microbiological testing

7. Match the clauses of ISO 22000:2018 (List I) with their respective core elements (List II).
List I: (Clauses)
P. Clause 4
Q. Clause 5
R. Clause 6
S. Clause 7
List II: (Core Elements)
I. Planning
II. Context of the organization
III. Support
IV. Leadership
(A) P-II, Q-IV, R-I, S-III
(B) P-IV, Q-II, R-III, S-I
(C) P-II, Q-I, R-IV, S-III
(D) P-I, Q-IV, R-II, S-III

8. A Food Safety Officer is evaluating a manufacturing facility's FSMS scope document. To demonstrate competency under ISO 22000 requirements, the scope must explicitly state:
(A) The products, processes, and sites covered by the FSMS
(B) The projected profitability and financial targets of the system
(C) The complete directory of all employees working on the production lines
(D) The specific recipes and proprietary formulations of all food products

9. Given below are two statements:
Statement I: The needs and expectations of interested parties identified under ISO 22000 must be reviewed and updated regularly.
Statement II: Only direct customers are considered relevant interested parties for the purpose of a Food Safety Management System.
(A) Both Statement I and Statement II are true
(B) Both Statement I and Statement II are false
(C) Statement I is true but Statement II is false
(D) Statement I is false but Statement II is true

10. Arrange the following steps in the logical sequence of establishing the context of the organization as per ISO 22000 methodology:
I. Determine the boundaries and applicability to establish the scope of the FSMS.
II. Identify external and internal issues relevant to the FSMS.
III. Determine the relevant requirements of interested parties.
IV. Identify the interested parties relevant to the FSMS.
Which of the following represents the correct sequence?
(A) II, IV, III, I
(B) I, II, III, IV
(C) IV, III, II, I
(D) II, I, IV, III

11. A medium-sized dairy processing plant is attempting to align with ISO 22000. They recognize that local municipal water quality fluctuates seasonally. Under which conceptual requirement must this specifically be analyzed before operational planning?
(A) Context of the organization (external issues)
(B) Operational Prerequisite Programs (OPRP)
(C) Management review outputs
(D) Performance evaluation

12. Which of the following statements regarding the definitions in ISO 22000:2018 is incorrect?
(A) Validation is applied prior to an activity and provides information about the capability to deliver intended results.
(B) Verification is applied during or after an activity and provides information on whether intended results were achieved.
(C) Correction and corrective action are synonymous terms indicating the elimination of the root cause of a nonconformity.
(D) Monitoring implies conducting a planned sequence of observations or measurements to assess whether a process is operating as intended.

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13. A food packaging company decides to expand its operations to include the production of edible food coatings. To comply with ISO 22000, what is the immediate necessary action concerning its FSMS?
(A) Conduct an immediate external surveillance audit with their certification body.
(B) Terminate current prerequisite programs and implement entirely new standards.
(C) Obtain an ISO 9001 quality certification prior to updating the safety system.
(D) Redefine and document the scope of the FSMS to cover the new processes.

139. (B) A simulated exercise testing the efficiency of a facility's recall tracking system.
A mock recall is a simulated exercise conducted by a facility to test the efficiency of its traceability system and the readiness of its recall management team. This drill measures the facility's ability to locate and account for a specific product lot throughout the distribution chain without executing an actual recall.

140. (B) Class I recall
Failing to declare major allergens like wheat or soy on a food package can cause severe, life-threatening allergic reactions, including anaphylaxis, in sensitive individuals. Because consumption of the mislabeled product poses a high risk of serious health consequences, this situation must be classified as a Class One recall.

141. (A) P-IV, Q-II, R-I, S-III
Recall classifications reflect the level of health risk. Detection of deadly toxins like botulinum requires a Class One recall. Reversible, low-level chemical allergen exposure triggers a Class Two recall. Minor labeling issues with no health hazard represent a Class Three recall, while routine stock rotation without regulatory violations is a market withdrawal.

142. (C) Recalled products contaminated with pathogenic bacteria can be safely donated to local food banks to prevent food waste.
Donating recalled food products contaminated with pathogens to charity organizations is strictly prohibited and highly hazardous. Recalled items must be isolated, labeled, and securely held until they are safely destroyed or reprocessed under regulatory oversight, with complete disposal logs maintained to verify that no contaminated units re-enter distribution.

143. (D) 95% recovery; the missing mass indicates a tracking flaw or undocumented loss requiring investigation.
Tracing nine hundred and fifty kilograms out of a one thousand kilogram batch yields a ninety-five percent recovery rate. The missing five percent represents a tracking gap or undocumented loss that requires formal investigation. Robust safety programs target a hundred percent reconciliation during trace exercises to verify database accuracy.

144. (A) Both A and R are true and R is the correct explanation of A.
Conducting a root cause analysis following a recall is vital for long-term food safety. This analysis identifies the fundamental process breakdown that allowed the contamination to occur, enabling the safety team to implement permanent corrective actions to prevent recurrence, rather than simply addressing the immediate symptoms of the deviation.

145. (B) Health Hazard Evaluation - Risk assessment by experts to determine the safety risk and recall class
A health hazard evaluation represents a formal risk assessment conducted by medical and scientific experts to evaluate the consumer health risk posed by a defective product. This evaluation determines the appropriate recall classification, whereas trade notifications, public warnings, and recall terminations represent administrative communication steps in the recall protocol.

146. (D) Consumers will purchase the product, causing preventable illnesses and severe reputational damage.
Delaying the notification of a pathogen contamination event prevents retailers and consumers from taking immediate protective action. This delay allows contaminated products to be purchased and consumed, leading to preventable foodborne illnesses, potential legal liability, and severe, long-term damage to the manufacturing company's public reputation.

147. (A) Unacceptable; standard mock recalls must demonstrate the ability to trace products within hours, not weeks.
Taking two weeks to complete a mock trace is unacceptable under modern food safety standards. Compliant systems must demonstrate the ability to trace ninety-five to one hundred percent of distributed products within hours, not weeks, to ensure that unsafe food can be rapidly removed from commerce during an actual emergency.

148. (C) The discovery of live Salmonella in a batch of roasted peanuts.
Detecting active Salmonella pathogens in ready-to-eat food poses a severe public health hazard, requiring a Class One recall. Class Three recalls are restricted to situations where consumption of the product is highly unlikely to cause adverse

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(D) A control measure essential to reduce a significant hazard to an acceptable level, managed by action criteria.

21. Which of the following is NOT a required element of the hazard control plan (HACCP/ OPRP plan) under ISO 22000?
(A) Critical limits for CCPs and action criteria for OPRPs
(B) Financial cost analysis of each control measure
(C) Monitoring procedures
(D) Corrections to be taken if limits or criteria are not met

22. Match the planning elements (List I) with their defining characteristics (List II).
List I: (Planning Elements)
P. PRP
Q. OPRP
R. CCP
S. Hazard Analysis
List II: (Defining Characteristics)
I. Step at which control is essential; uses critical limits
II. Basic hygienic conditions maintained throughout the organization
III. Process of identifying and assessing potential food safety risks
IV. Essential control measure based on action criteria
(A) P-II, Q-IV, R-I, S-III
(B) P-I, Q-II, R-III, S-IV
(C) P-IV, Q-I, R-II, S-III
(D) P-II, Q-I, R-IV, S-III

23. A food safety team is analyzing a pasteurization step. They determine that failure of this step will lead to survival of pathogens, and no subsequent step will eliminate the hazard. To demonstrate competency in operational planning, how should they classify this step?
(A) As a Prerequisite Program (PRP)
(B) As an Operational Prerequisite Program (OPRP)
(C) As a Quality Control Point (QCP)
(D) As a Critical Control Point (CCP)

24. Given below are two statements:
Statement I: Critical limits at CCPs must be measurable.
Statement II: Action criteria for OPRPs can only be observable, not measurable.
(A) Both Statement I and Statement II are true
(B) Both Statement I and Statement II are false
(C) Statement I is true but Statement II is false
(D) Statement I is false but Statement II is true

25. Arrange the following steps of Hazard Analysis according to ISO 22000 operational planning:
I. Hazard assessment (determining acceptable levels and risk).
II. Hazard identification.
III. Selection and categorization of control measures.
IV. Preparation of flow diagrams and process steps description.
Which of the following represents the correct sequence?
(A) IV, II, I, III
(B) II, I, IV, III
(C) IV, I, II, III
(D) I, II, III, IV

26. A beverage manufacturer uses pH to monitor product safety. The critical limit is set at pH $\leq$ 4.2. During production, a batch records a pH of 4.5. Applying the concepts of ISO 22000, what immediate action must be taken?
(A) Immediately recalibrate the pH meter and release the product batch to the market.
(B) Handle the affected batch as potentially unsafe according to standard procedures.
(C) Dilute the product with sterile processing water to lower the pH to acceptable limits.
(D) Update the company's food safety policy to reflect a higher acceptable target pH.

27. Which of the following statements regarding the Food Safety Team under ISO 22000 is incorrect?
(A) Top management is explicitly prohibited from interacting with the food safety team.
(B) The team must possess multidisciplinary knowledge and experience.
(C) The team leader is responsible for managing the team and ensuring relevant training.
(D) The team is responsible for developing and maintaining the FSMS.

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28. A food plant relies on a metal detector as an OPRP. The action criterion is no metal fragments larger than 2.0 mm. If the device detects a 2.5 mm fragment, the operator removes the affected package but does not stop the line. Why is this action considered incomplete under ISO 22000?
(A) Because any failure of an OPRP requires an

(A) Auditors must act objectively and impartially during the audits.
(B) Internal audits must only be conducted by external consultants.
(C) Production managers lack the specific technical knowledge to audit processes.
(D) Internal audits are only required to evaluate administrative departments.

44. What is the immediate effect of using a significantly uncalibrated thermometer at a CCP in a cooking process?
(A) An automatic and measurable increase in the final product's shelf-life.
(B) A significant reduction in overall utility and operational costs.
(C) Loss of control over hazards, potentially releasing unsafe food.
(D) A substantial enhancement of the existing prerequisite programs.

45. Identify the incorrect pair related to performance evaluation:
(A) Internal Audit - Self-assessment of system compliance
(B) Management Review - Executive assessment of system performance
(C) Data Analysis - Statistical evaluation of process trends
(D) Validation - Modifying the policy after an outbreak

46. Consider the following statements regarding ISO 9001:2015 Quality Management System (QMS):
I. It is founded on seven quality management principles, including customer focus and leadership.
II. It exclusively applies to organizations in the manufacturing sector.
III. It promotes the adoption of a process approach incorporating the PDCA cycle.
IV. It mandates risk-based thinking to determine risks and opportunities.
Which of the above statements are correct?
(A) I, II and III
(B) I, III and IV
(C) II, III and IV
(D) I, II and IV

47. The primary focus of ISO 9001:2015 compared to food safety standards is on:
(A) Eliminating microbiological foodborne pathogens and chemical contamination.
(B) Meeting customer, statutory, and regulatory requirements consistently.
(C) Implementing and verifying hazard analysis critical control point plans.
(D) Ensuring comprehensive traceability of all raw agricultural input materials.

48. Which of the following best defines 'Risk-based thinking' as introduced in ISO 9001:2015?
(A) Establishing a separate risk management department with a standalone manual.
(B) Focusing exclusively on financial risk factors and commercial liabilities.
(C) Eliminating all potential operational risks prior to starting business activities.
(D) Considering risks and opportunities in QMS processes to drive improvement.

49. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R):
Assertion (A): ISO 9001 promotes the process approach for developing, implementing, and improving the effectiveness of a QMS.
Reason (R): Understanding and managing interrelated processes as a system contributes to the organization's effectiveness and efficiency in achieving intended results.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

50. According to ISO standards, what does a Quality Management System (QMS) primarily formalize?
(A) The financial accounting and auditing procedures of the enterprise.
(B) The long-term marketing and public relations communication strategy.
(C) Procedures and responsibilities for achieving quality objectives.
(D) The proprietary formulations and specific recipes of manufactured products.

51. Which of the following is NOT one of the seven Quality Management Principles upon which ISO 9001:2015 is based?
(A) Profit maximization
(B) Customer focus
(C) Leadership

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36. Which of the following is NOT typically a required input for the Management Review under ISO 22000?
(A) Results of internal and external audits
(B) Review of the food safety policy
(C) Information on the performance and effectiveness of the FSMS
(D) The daily attendance records of administrative staff

37. Match the evaluation activities (List I) with their functional descriptions (List II).
List I: (Evaluation Activities)
P. Monitoring
Q. Verification
R. Validation
S. Updating
List II: (Functional Descriptions)
I. Confirming capability prior to implementation
II. Routine real-time observation of a parameter
III. Post-implementation check of compliance
IV. Modifying the system based on new information
(A) P-II, Q-III, R-I, S-IV
(B) P-III, Q-II, R-I, S-IV
(C) P-I, Q-III, R-II, S-IV
(D) P-II, Q-I, R-III, S-IV

38. A food plant discovers during an internal audit that temperature logs for a cooling process were not filled out for two days. To demonstrate competence in handling nonconformities, the food safety team must first:
(A) Terminate the employment of the operator who was responsible for temperature logging.
(B) Modify the historical audit records to prevent any external non-compliance penalties.
(C) Identify the root cause, evaluate product safety, and implement corrective actions.
(D) Immediately arrange a comprehensive management review meeting to rewrite the safety policy.

39. Given below are two statements:
Statement I: Both ISO 9001:2015 and ISO 22000:2018 share the High-Level Structure (HLS) based on Annex SL.
Statement II: Because they share the same structure, an organization certified to ISO 9001 is automatically compliant with ISO 22000 requirements.
(A) Both Statement I and Statement II are true
(B) Both Statement I and Statement II are false
(C) Statement I is true but Statement II is false
(D) Statement I is false but Statement II is true

40. Arrange the standard steps of managing a nonconformity and corrective action in correct sequential order:
I. Evaluate the need for action to eliminate the root cause.
II. Review the nonconformity.
III. Implement any action needed.
IV. Review the effectiveness of the corrective action taken.
Which of the following represents the correct sequence?
(A) I, II, III, IV
(B) II, I, III, IV
(C) II, III, I, IV
(D) I, III, II, IV

41. A company experiences repeated instances of package seal failures. They apply root cause analysis and find that the sealing machine's heating element degrades faster than anticipated. Under ISO 22000 Improvement clause, what is the most appropriate action?
(A) Increase the daily frequency of finished product testing protocol.
(B) Implement a preventive maintenance schedule and update the FSMS.
(C) Take no action if the final packaged product is not immediately toxic.
(D) Lower the critical limits of the sealing machine to match the degraded performance.

42. Which of the following: statements regarding control of monitoring and measuring equipment is incorrect?
(A) Equipment must be calibrated or verified at specified intervals.
(B) Uncalibrated equipment may be used if the operator believes it is accurate.
(C) Equipment must be safeguarded from adjustments that would invalidate measurement results.
(D) Records of calibration and verification must be retained.

43. During a surveillance audit, the auditor finds that the internal audit program lacks independence, as the production manager audits their own department. This violates ISO 22000 principles because:

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Stage 2 certification audit.
II. A certification body assesses compliance with the standard.
III. ISO itself issues the certificates to the conforming organizations.
IV. Surveillance audits are conducted periodically after initial certification.
Which of the above statements are correct?
(A) I, II and III
(B) I, II and IV
(C) II, III and IV
(D) I, III and IV

77. After an organization successfully achieves ISO 22000 certification, what is the standard frequency for surveillance audits conducted by the certification body?
(A) Once every 3 years
(B) Biannually (twice a year)
(C) Annually (at least once a year)
(D) Only when the organization requests it

78. Which statement correctly describes the standard validity period of an ISO management system certificate (e.g., ISO 9001, ISO 22000) before recertification is required?
(A) 1 year
(B) 2 years
(C) 3 years
(D) 5 years

79. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R):
Assertion (A): The Stage 1 audit of the ISO certification process is primarily a document review and readiness assessment.
Reason (R): It determines whether the organization's documented system meets the standard's requirements and if they are prepared for the comprehensive Stage 2 audit.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

80. How is 'Lean manufacturing' primarily defined in the context of TQM and operational efficiency?
(A) A warehouse strategy designed to maximize material storage and avoid stockouts.
(B) A formulation technique aimed at lowering the caloric value of food items.
(C) A statistical quality control framework used to monitor processing variances.
(D) A systematic method to eliminate waste (Muda) without reducing productivity.

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81. Which of the following is NOT typically classified as one of the standard wastes (Muda) in Lean manufacturing?
(A) Value-added processing
(B) Overproduction
(C) Waiting
(D) Unnecessary transportation

82. Match the types of audits (List I) with their defining descriptions (List II).
List I: (Types of Audits)
P. First-party audit
Q. Second-party audit
R. Third-party audit
S. Recertification audit
List II: (Defining Descriptions)
I. Conducted by an independent certification body
II. Internal audit conducted by the organization itself
III. Conducted to renew an expiring certificate
IV. Conducted by a customer on a supplier
(A) P-II, Q-IV, R-I, S-III
(B) P-I, Q-II, R-IV, S-III
(C) P-II, Q-I, R-IV, S-III
(D) P-IV, Q-II, R-I, S-III

83. A food manufacturer is preparing for a Stage 2 ISO 22000 certification audit. To demonstrate competency, the Quality Assurance Manager must ensure that:
(A) The FSMS is fully implemented, with completed records, audits, and reviews.
(B) Only the high-level policy manual is ready, as daily operational logs are optional.
(C) Non-essential operators are sent home to minimize the chance of procedural errors.
(D) Financial incentives are prepared to ensure a favorable outcome from the auditor.

84. Given below are two statements:
Statement I: Certification bodies assess organizations against ISO standards.
Statement II: Accreditation bodies (like NABL or NABCB) assess and recognize the competence of certification bodies.
(A) Both Statement I and Statement II are true

(D) Evidence-based decision making

52. Match the phases of the PDCA cycle (List I) with their corresponding actions in QMS (List II).
List I: (PDCA Phases)
P. Plan
Q. Do
R. Check
S. Act
List II: (Corresponding Actions)
I. Monitor and measure processes against policies
II. Take actions to improve performance
III. Set objectives and determine resources required
IV. Implement what was planned
(A) P-III, Q-IV, R-I, S-II
(B) P-III, Q-I, R-IV, S-II
(C) P-IV, Q-III, R-I, S-II
(D) P-I, Q-II, R-III, S-IV

53. A food processing company receives consistent feedback that its cereal packaging is difficult to open. Applying the 'Customer Focus' principle of ISO 9001, the most competent action is to:
(A) Formally notify customers that current packaging is unalterable due to safety standards.
(B) Investigate and implement alternative packaging that balances safety and usability.
(C) Disregard the consumer feedback entirely provided that the food inside remains secure.
(D) Direct additional marketing resources toward modifying consumer aesthetic perceptions.

54. Given below are two statements:
Statement I: The ISO 9001:2015 standard includes a specific, separate clause titled "Preventive Action."
Statement II: In ISO 9001:2015, the concept of preventive action is integrated throughout the standard via risk-based thinking.
(A) Both Statement I and Statement II are true
(B) Both Statement I and Statement II are false
(C) Statement I is true but Statement II is false
(D) Statement I is false but Statement II is true

55. Arrange the application of the process approach combined with the PDCA cycle in a sequential flow:
I. Determine the inputs required and outputs expected from the processes.
II. Determine the sequence and interaction of these processes.
III. Evaluate processes and implement any changes needed to ensure they achieve intended results.
IV. Assign responsibilities and authorities for processes.
Which of the following represents the correct sequence?
(A) I, II, IV, III
(B) II, I, III, IV
(C) I, IV, II, III
(D) IV, I, II, III

56. A bakery realizes that its reliance on a single supplier for specialized flour is a vulnerability. Under ISO 9001 risk-based thinking, how should they address this?
(A) Qualify alternative suppliers as a documented contingency.
(B) Suspend all manufacturing operations until a new source is qualified.
(C) Modify the recipe to utilize standard flour from local retailers.
(D) Delay taking any action until an actual delivery failure occurs.

57. Which statement about the 'Process approach' in QMS is incorrect?
(A) It involves defining and managing processes and their interactions.
(B) It treats every department as an isolated entity with independent goals.
(C) It enhances the ability to focus effort on key processes and opportunities for improvement.
(D) It provides consistent and predictable results through a system aligned with strategic direction.

58. A customer files a complaint regarding a foreign object in a beverage. In an ISO 9001 certified company, which immediate QMS procedure is triggered to prevent recurrence?
(A) Management review process
(B) Corrective action procedure
(C) Internal auditing program
(D) Supplier evaluation system

59. What is a direct organizational effect of failing to implement the 'Evidence-based decision making' principle in QMS?
(A) Intuition-based decisions leading to inconsistent quality and unresolved issues.

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(B) National Authority for Biological Laboratories
(C) National Accreditation Board for Testing and Calibration Laboratories
(D) National Association of Business Laboratories

93. Which of the following best describes the scope of NABH (National Accreditation Board for Hospitals & Healthcare Providers)?
(A) Formally accrediting national agricultural colleges and training universities.
(B) Evaluating the specific nutritional profiles of pre-packaged retail products.
(C) Issuing safety certifications directly to food manufacturing companies.
(D) Accrediting healthcare facilities to improve patient safety and care quality.

94. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R):
Assertion (A): Economically Motivated Adulteration (EMA) is primarily driven by the intent to cause public health harm.
Reason (R): EMA involves the fraudulent addition of non-authentic substances to increase the apparent value or reduce the cost of a food product.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

95. How is 'Food Fraud' officially defined in the context of food safety and integrity?
(A) The accidental biological or chemical contamination of raw materials during transport.
(B) The intentional substitution or tampering of food products for economic gain.
(C) The natural spoilage of perishable cargo caused by failure in refrigeration systems.
(D) The compliant marketing of genetically modified agricultural foods to consumers.

96. Which of the following is NOT typically classified as a type of food fraud?
(A) Counterfeiting brand names
(B) Dilution of premium ingredients
(C) Unapproved chemical enhancement
(D) Cross-contact with allergens

97. Match the specific types of food fraud (List I) with their definitions (List II).
List I: (Types of Food Fraud)
P. Substitution
Q. Dilution
R. Concealment
S. Counterfeiting
List II: (Definitions)
I. Mixing a high-value liquid ingredient with a lower value liquid
II. Hiding the low quality of a food ingredient or product
III. Replacing a high-value ingredient with a cheaper alternative
IV. Copying the brand name and packaging concept of a popular food
(A) P-III, Q-I, R-II, S-IV
(B) P-I, Q-III, R-II, S-IV
(C) P-III, Q-II, R-I, S-IV
(D) P-II, Q-I, R-IV, S-III

98. A Quality Assurance manager is tasked with preventing food fraud in a spice manufacturing plant. To demonstrate competency in Vulnerability Assessment and Critical Control Points (VACCP), what should be their primary focus?
(A) Executing routine environmental swabbing to detect pathogenic bacterial colonies.
(B) Calibrating processing sensors and automated high-temperature monitoring systems.
(C) Assessing the supply chain for economic vulnerabilities to prevent adulteration.
(D) Conducting regular observational audits of employee personal handwashing protocols.

99. Given below are two statements:
Statement I: The addition of melamine to milk to artificially inflate apparent protein content is an example of Economically Motivated Adulteration (EMA).
Statement II: Food fraud incidents like the melamine scandal only impact market economics and never pose serious public health risks.
(A) Both Statement I and Statement II are true
(B) Both Statement I and Statement II are false
(C) Statement I is true but Statement II is false
(D) Statement I is false but Statement II is true

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(B) P-IV, Q-III, R-I, S-II
(C) P-III, Q-I, R-IV, S-II
(D) P-I, Q-IV, R-III, S-II

68. A food plant supervisor wants to implement Lean Manufacturing principles to reduce waste. Which action demonstrates competency in this approach?
(A) Bulk purchasing raw materials to obtain volume discounts, generating massive warehouses.
(B) Running assembly conveyor belts significantly faster than their designed limits.
(C) Deploying additional quality control inspectors at the end of the production line.
(D) Redesigning process flows to eliminate material waste and unnecessary handling.

69. Given below are two statements:
Statement I: Traditional Quality Control focuses primarily on detecting defects in finished products.
Statement II: Total Quality Management focuses on defect prevention by improving the processes that create the product.
(A) Both Statement I and Statement II are true
(B) Both Statement I and Statement II are false
(C) Statement I is true but Statement II is false
(D) Statement I is false but Statement II is true

70. Arrange the phases of the Six Sigma methodology (DMAIC) in their correct sequence:
I. Measure process performance.
II. Control the improved process.
III. Define the problem or project goals.
IV. Analyze the data to determine root causes.
V. Improve the process by eliminating defects.
Which of the following represents the correct sequence?
(A) III, I, IV, V, II
(B) I, III, IV, V, II
(C) III, IV, I, V, II
(D) I, IV, III, II, V

71. A warehouse manager applies the first step of 5S (Sort / Seiri) to the packaging storage area. What specific action should they take?
(A) Thoroughly wash all storage shelves and sweep the warehouse floor.
(B) Apply highly visible labels to every type of packaging container.
(C) Design a calendar schedule to sustain the tidiness of the workspace.
(D) Clear out all obsolete, damaged, and unneeded materials.

72. Which of the following statements about continuous improvement (Kaizen) is incorrect?
(A) It requires substantial capital investment for every improvement made.
(B) It relies on small, incremental changes rather than massive overhauls.
(C) It involves everyone in the organization, from top management to assembly line workers.
(D) It encourages a culture where employees feel comfortable suggesting changes.

73. A beverage company faces a high rate of fill-level inconsistencies in its bottles. Adopting TQM principles, how should they resolve this?
(A) Immediately scrap any filled container that fails to satisfy the volumetric limit.
(B) Analyze process variation with statistical tools and calibrate the machine.
(C) Adjust and lower the final fill-level specifications to tolerate machine errors.
(D) Hold operators working on the highest defect shift personally accountable.

74. What is the most likely long-term effect of implementing a TQM program without the visible commitment and support of top management?
(A) The program will succeed because self-motivated operators will sustain it.
(B) The program will fail due to lack of support, direction, and resources.
(C) Product quality will improve rapidly but overall company profits will decline.
(D) External auditors will automatically award a quality management certification.

75. Identify the incorrect pair regarding TQM gurus and their contributions:
(A) Philip Crosby - Invention of the Six Sigma statistical threshold
(B) W. Edwards Deming - PDCA Cycle and 14 Points for Management
(C) Joseph M. Juran - Quality Trilogy (Planning, Control, Improvement)
(D) Kaoru Ishikawa - Cause and Effect (Fishbone) diagram

76. Consider the following statements regarding the ISO certification process:
I. An organization must conduct an internal audit and management review before the

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immediate and complete shutdown of the entire production line.
(B) Because metal detection procedures must always be classified as a Critical Control Point (CCP) instead.
(C) Because the operator must evaluate the cause and take corrective action to prevent recurrence.
(D) Because the operator must inform the national food safety authority before resuming any packaging operations.

29. What is a direct effect of inadequate resource allocation by top management during the planning phase of ISO 22000?
(A) The immediate revocation of the operating license.
(B) An improved morale among staff due to lower workload.
(C) An automatic transfer of duties to external auditors.
(D) Failure to effectively implement and maintain the FSMS.

30. Identify the correct pair regarding organizational roles in ISO 22000:
(A) Internal auditor - Defining the critical limits for CCPs
(B) External stakeholder - Managing day-to-day HACCP monitoring
(C) Top management - Establishing the food safety policy
(D) Food handlers - Formulating statutory regulations

31. Consider the following statements regarding Performance Evaluation and Improvement under ISO 22000:
I. Internal audits must be conducted at planned intervals.
II. Management review must include an assessment of the performance of external providers.
III. Continual improvement is only required when a major nonconformity is identified.
IV. The food safety team must analyze results of verification activities.
Which of the above statements are correct?
(A) I, II and III
(B) I, II and IV
(C) II, III and IV
(D) I, III and IV

32. In ISO 22000:2018, Performance Evaluation is primarily detailed under which major clause?
(A) Clause 6
(B) Clause 7
(C) Clause 9
(D) Clause 10

33. Which of the following correctly describes the purpose of the Management Review in an FSMS?
(A) To evaluate the FSMS to ensure its continuing suitability, adequacy, and effectiveness.
(B) To evaluate the individual performance of production line workers for annual salary increments.
(C) To act as a comprehensive external audit conducted annually by an independent certification body.
(D) To formally review and approve the daily operational log sheets of all critical control points.

34. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R):
Assertion (A): Continual improvement of the FSMS is a mandatory requirement under ISO 22000.
Reason (R): The standard is based on the Plan-Do-Check-Act (PDCA) cycle, which inherently drives continuous enhancement of processes and system effectiveness.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

35. In the context of performance evaluation, how is 'Validation' defined?
(A) Obtaining evidence that a control measure is capable of effectively controlling the hazard.
(B) The application of methods, procedures, tests, and other evaluations to determine compliance with the HACCP plan.
(C) Conducting a planned sequence of real-time observations or measurements to assess process parameters.
(D) Performing a retrospective statistical analysis of all documented customer complaints and feedback.

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(B) Both Statement I and Statement II are false
(C) Statement I is true but Statement II is false
(D) Statement I is false but Statement II is true

85. What is the most appropriate primary goal of a surveillance audit conducted by a certification body?
(A) To conduct a full and exhaustive review of every individual clause of the standard.
(B) To verify that the certified system remains maintained and effective over time.
(C) To completely re-evaluate and rewrite the basic structural food safety policies.
(D) To issue an entirely new regulatory certificate with an updated expiration date.

86. An external auditor issues a "Major Non-Conformance" during a Stage 2 certification audit because critical limits at a CCP were not being monitored. Applying the certification process rules, what must the organization do to achieve certification?
(A) Disregard the finding since a single non-conformance will not block certification.
(B) Delay addressing the issue until the subsequent annual surveillance audit takes place.
(C) Apply corrective actions and submit evidence to the auditor for verification.
(D) Reclassify the critical step as a basic prerequisite program to bypass the rule.

87. Which of the following is an incorrect statement regarding the role of ISO (International Organization for Standardization)?
(A) ISO is responsible for developing and publishing formal international standards.
(B) ISO does not personally conduct compliance audits or award certificates.
(C) ISO standards are created by technical committees of global industry experts.
(D) ISO delegates the authority to issue certificates to national governments.

88. A company certified to ISO 22000:2005 needs to transition to ISO 22000:2018. What is the standard procedure for this transition?
(A) The company must implement new rules and be audited within a set transition window.
(B) The certification transitions automatically to the updated standard without any external audits.
(C) The management must completely scrap their old operating system and design a new one from scratch.
(D) The facility must successfully obtain a quality system certification before upgrading the safety plan.

89. What is the regulatory and operational effect if an organization consistently fails its surveillance audits and does not address major non-conformities?
(A) External auditors will temporarily assume control of corporate operations.
(B) The certification body will suspend or withdraw the ISO certificate.
(C) National regulators will immediately issue an order to close the facility.
(D) Scheduled surveillance visits will be officially postponed for five years.

90. Identify the correct pair related to audit terminology:
(A) Objective evidence - Informal workplace rumors and unverified statements from plant operators
(B) Audit criteria - The reference policies or requirements used to compare audit evidence
(C) Nonconformity - The full and complete satisfaction of a documented regulatory requirement
(D) Lead Auditor - The specific internal employee who is responsible for writing the safety manual

91. Consider the following statements regarding accreditation bodies in India:
I. NABL provides accreditation to testing and calibration laboratories.
II. NABH is responsible for the accreditation of hospitals and healthcare providers.
III. Both NABL and NABH are constituent boards of the Quality Council of India (QCI).
IV. NABL accreditation is mandatory for all primary agricultural farms in India.
Which of the above statements are correct?
(A) I, II and III
(B) I, II and IV
(C) II, III and IV
(D) I, III and IV

92. What does the acronym NABL stand for in the context of Indian accreditation?
(A) National Agency for Basic Laboratory

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(B) Excessive dependence on complex statistical software that delays manufacturing schedules.
(C) An immediate and automatic termination of all existing safety certifications.
(D) A temporary boost in staff motivation due to highly flexible operating guidelines.

60. Identify the correct pair relating to QMS elements:
(A) Relationship management - Focusing only on internal employee conflicts
(B) Improvement - Maintaining the status quo to ensure stability
(C) Engagement of people - Utilizing employee competence to enhance value
(D) Process approach - Evaluating finished goods at the end of the line only

61. Consider the following statements about Total Quality Management (TQM) philosophy:
I. TQM is an organization-wide effort to infuse quality into every activity.
II. It emphasizes that quality is the sole responsibility of the Quality Control department.
III. Customer satisfaction is a core driving force of TQM.
IV. It involves continuous improvement of processes.
Which of the above statements are correct?
(A) I, II and III
(B) I, III and IV
(C) II, III and IV
(D) I, II and IV

62. The concept of 'Kaizen', a fundamental element of TQM, originated in which country?
(A) United States
(B) Germany
(C) Japan
(C) India

63. Which of the following correctly describes the core philosophy of Total Quality Management (TQM)?
(A) A production strategy that prioritizes high volume output while permitting minor product defects.
(B) A management approach focused on long-term success through customer satisfaction and staff participation.
(C) An operational framework designed specifically for successfully passing external regulatory checks.
(D) A manufacturing philosophy centered on removing the human element entirely from production lines.

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64. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R):
Assertion (A): Employee empowerment and involvement are critical success factors for Total Quality Management.
Reason (R): Employees who are closest to the processes are often best positioned to identify inefficiencies and suggest improvements.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

65. What does the term 'Six Sigma' refer to in the context of TQM tools?
(A) A method targeting 3.4 defects per million opportunities.
(B) A process mapping system designed to map exactly six distinct steps.
(C) A Japanese philosophy centered on small, continuous improvements.
(D) An organization method utilizing five visual management principles.

66. Which of the following is NOT one of the steps in the 5S methodology?
(A) Sort (Seiri)
(B) Set in order (Seiton)
(C) Synergize (Soji)
(D) Standardize (Seiketsu)

67. Match the Japanese terms of the 5S methodology (List I) with their English equivalents (List II).
List I: (Japanese Terms)
P. Seiri
Q. Seiton
R. Seiso
S. Shitsuke
List II: (English Equivalents)
I. Shine / Sweep
II. Sustain
III. Sort
IV. Set in order
(A) P-III, Q-IV, R-I, S-II

100. What is the most appropriate reason a food manufacturer should utilize an NABL-accredited laboratory for end-product safety testing?
(A) Because utilizing non-accredited analytical services is strictly prohibited under federal laws.
(B) Because accredited facilities offer fully subsidized analytical testing for local enterprises.
(C) Because accredited institutions are also authorized to issue quality management certifications.
(D) Because NABL accreditation formally recognizes laboratory competence, ensuring accuracy.

101. A shipment of premium Manuka honey is suspected of being adulterated with high-fructose corn syrup. Applying detection strategies, which analytical technique is most commonly and effectively used to detect this type of dilution?
(A) Standard Plate Count (SPC) microbiological analysis
(B) Stable Isotope Ratio Mass Spectrometry (IRMS)
(C) Visual evaluation of product color parameters
(D) Measurement of pH levels using standard litmus paper

102. Which of the following statements incorrectly distinguishes between Accreditation and Certification?
(A) Certification is the written assurance by a third party that a product, process, or service conforms to specified requirements.
(B) Accreditation is the formal recognition by an authoritative body of the competence to work to specified standards.
(C) NABL provides ISO 22000 certification directly to food manufacturing companies.
(D) A Certification Body must seek accreditation to demonstrate its competence and impartiality.

103. In a famous food fraud case, products labeled as 'Extra Virgin Olive Oil' were found to contain 80% cheaper refined hazelnut oil. This specific practice is best categorized as:
(A) Accidental cross-contamination
(B) Theft and grey market diversion
(C) Overproduction
(D) Mislabelling and Substitution

104. What is the likely cause-and-effect relationship between global market dynamics and the risk of Economically Motivated Adulteration (EMA)?
(A) Market scarcity and high prices increase the economic incentive for adulteration.
(B) Elevated market values lead to a total reduction in fraud due to increased buyer scrutiny.
(C) An oversupply of inexpensive ingredients leads to a significant increase in counterfeiting.
(D) Rigorous regulatory enforcement directly results in higher rates of product substitution.

105. Identify the incorrect pair regarding food fraud detection strategies:
(A) DNA Barcoding - Detecting species substitution in meat and seafood
(B) Sensory Evaluation - Detecting heavy metal contamination in spices
(C) Chromatography - Profiling the chemical composition to detect unapproved additives
(D) Spectroscopy (e.g., FTIR) - Rapid screening for adulterants in liquids

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106. Consider the following statements regarding personal hygiene requirements in food handling under FSSAI regulations (Schedule 4):
I. Food handlers must wear clean protective clothing, head covering, and footwear.
II. Routine medical examination of food handlers must be carried out annually.
III. Wearing jewelry, watches, and pins is permitted as long as they are washed.
IV. Food handlers must be vaccinated against enteric diseases.
Which of the above statements are correct?
(A) I, II and IV
(B) I, II and III
(C) II, III and IV
(D) I, III and IV

107. According to FSSAI guidelines, which of the following practices is strictly prohibited for food handlers while in a food preparation area?
(A) Spitting, smoking, or chewing tobacco
(B) Thoroughly washing hands with clean water
(C) Properly wearing a protective hairnet
(D) Trimming fingernails outside work hours

108. Which of the following best describes the core principle of Integrated Pest Management (IPM) in a food processing plant?

141. Which of the following is NOT typically a statutory function of a Designated Officer (DO) under the FSSA 2006?
(A) Issuing or canceling operating licenses for Food Business Operators.
(B) Sanctioning court prosecutions for offences punishable with prison.
(C) Receiving official reports of food analysis directly from Food Analysts.
(D) Formulating and enacting new parliamentary acts on food safety laws.

142. Match the offences under FSSA 2006 (List I) with their respective nature or general penalty scope (List II).
List I: (Offences under FSSA 2006)
P. Selling food not of the nature, substance or quality demanded
Q. Penalty for sub-standard food
R. Penalty for manufacturing unsafe food causing death
S. Penalty for misbranded food
List II: (Nature or General Penalty Scope)
I. Imprisonment not less than 7 years (up to life) and high fine
II. Fine which may extend to five lakh rupees
III. Fine which may extend to two lakh rupees
IV. Fine which may extend to three lakh rupees
(A) P-II, Q-I, R-III, S-IV
(B) P-I, Q-II, R-IV, S-III
(C) P-III, Q-II, R-I, S-IV
(D) P-II, Q-III, R-I, S-IV

143. A Food Business Operator (FBO) receives a credible lab report that a distributed batch of their product contains hazardous levels of a chemical contaminant. To demonstrate competency in legal compliance, the FBO must immediately:
(A) Deny the findings publicly and continue standard retail sales operations.
(B) Initiate a food recall and notify authorities and consumers.
(C) Change the legal registration name of the enterprise to bypass liability.
(D) Export the entire contaminated batch immediately to an overseas market.

144. Given below are two statements:
Statement I: A Designated Officer can issue an 'Improvement Notice' to an FBO if they fail to comply with regulations.
Statement II: If the FBO fails to comply with the Improvement Notice, the Designated Officer may suspend their license.
(A) Both Statement I and Statement II are true
(B) Both Statement I and Statement II are false
(C) Statement I is true but Statement II is false
(D) Statement I is false but Statement II is true

145. What is the most appropriate function of the Food Safety Appellate Tribunal under the FSSA 2006?
(A) To hear appeals from Adjudicating Officers.
(B) To perform routine laboratory testing of food samples.
(C) To issue new food business licenses.
(D) To train food handlers on personal hygiene.

146. A company sells edible vegetable oil in a container whose design and label deliberately mimic a famous national brand, though the ingredients are perfectly safe. Under FSSA 2006, applying legal classification, this product is:
(A) Unsafe food
(B) Sub-standard food
(C) Misbranded food
(D) Contaminated food

147. Which of the following statements concerning offences and penalties under FSSA 2006 is incorrect?
(A) An FBO cannot be penalized if they prove the unsafe food was sold without their knowledge, even if they manufactured it.
(B) Penalties for manufacturing unsafe food are graded based on the severity of the injury caused to the consumer.
(C) Selling food containing extraneous matter attracts a monetary penalty.
(D) Misbranding offenses are primarily dealt with via monetary fines rather than immediate imprisonment, unless combined with severe safety violations.

148. A Food Safety Officer (FSO) suspects that a batch of milk at a retail shop is adulterated. During enforcement, the FSO draws samples. What is the legal requirement for handling these samples?
(A) The FSO must consume one sample to test it personally.
(B) The FSO must leave all samples at the shop and only take photographs.
(C) The FSO must immediately throw away the suspected batch before any testing.

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corporate healthcare insurance plans.
(D) To assess their individual daily dietary habits and general nutritional status.

116. A bakery supervisor spots a cockroach near the ingredient storage. Applying IPM concepts, what should be the immediate integrated response?
(A) Instantly apply chemical pesticide sprays throughout the ingredient storage warehouse.
(B) Take no action unless a widespread infestation of multiple pests is observed.
(C) Transfer all stored ingredients to the processing floor and leave the warehouse empty.
(D) Document the pest sighting, seal cracks, clean the area, and contact pest control.

117. Which statement regarding protective clothing in a food plant is incorrect?
(A) Protective clothing must be laundered regularly and maintained in a clean condition.
(B) Pockets above the waist are recommended to hold pens and small tools.
(C) Buttons are generally discouraged on lab coats; snap fasteners or Velcro are preferred to prevent physical contamination.
(D) Street shoes should be changed or covered before entering high-risk processing areas.

118. An employee at a food packing unit informs the supervisor that they have been diagnosed with jaundice (Hepatitis A). According to standard food safety regulations, the supervisor must:
(A) Allow the employee to work only in the packaging section.
(B) Provide the employee with double gloves and a mask and allow them to work.
(C) Exclude the employee from food areas until cleared by a doctor.
(D) Treat the employee with over-the-counter medication in the first-aid room.

119. What is a direct cause-and-effect relationship regarding poor facility design and pest control?
(A) Installing tightly fitted doors on exterior entries causes rapid rodent breeding.
(B) Painting the processing area walls with white paint attracts nocturnal flying insects.
(C) Utilizing stainless steel equipment on the line generates chemical pest resistance.
(D) Leaving gaps under doors and unmeshed windows leads to increased pest entry.

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120. Identify the correct pair regarding hygiene monitoring tools:
(A) Contact plate (RODAC) - Enumerates viable microbial colonies on flat surfaces
(B) ATP bioluminescence swab - Measures the exact number of pathogenic bacteria
(C) UV light - Used to sterilize the interior of complex piping systems
(D) Visual inspection - The most reliable method to detect microscopic biofilms

121. Consider the following statements about food hazard types:
I. Biological hazards include bacteria, viruses, and parasites.
II. Chemical hazards can include naturally occurring toxins like aflatoxins.
III. Physical hazards typically include pieces of glass, metal, or hard plastic.
IV. Allergens are considered a subset of physical hazards.
Which of the above statements are correct?
(A) I, II and III
(B) I, II and IV
(C) II, III and IV
(D) I, III and IV

122. Under global food safety standards and FSSAI guidelines, which of the following is considered one of the major food allergens requiring declaration?
(A) Apples
(B) Peanuts
(C) Chicken meat
(D) White rice

123. Which of the following is a correct principle of hygienic design for food plant equipment?
(A) Food contact surfaces must be smooth, non-absorbent, and corrosion-resistant.
(B) Equipment surfaces should be designed with porous materials to absorb moisture.
(C) Equipment should have dead ends and sharp internal corners to retain residues.
(D) Equipment should use standard exposed fasteners in primary product flow zones.

124. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R):
Assertion (A): Allergen cross-contact is essentially the same concept as microbial cross-contamination.

ANSWERS

1. (B) I, II and IV
ISO 22000:2018 is designed to apply to all organizations involved in any aspect of the food chain, regardless of size or sector, including packaging manufacturers. It outlines the requirements for establishing a robust food safety management system to ensure safe food consumption. The standard integrates the principles of hazard analysis and critical control points defined by Codex Alimentarius.

2. (D) 2018
The ISO 22000 standard, which specifies international requirements for food safety management systems, was originally introduced in 2005. To align with modern food safety challenges and the high-level structure of other ISO management systems, the standard underwent its most recent comprehensive revision and was officially published in its current form in the year 2018.

3. (A) It requires determining external and internal issues relevant to the organization's purpose and its FSMS objectives.
Establishing the context of the organization under international standards involves identifying both internal and external factors that can influence the strategic direction and performance of the safety management system. Organizations must analyze diverse environmental, technological, legal, and cultural aspects to ensure that the system is properly designed to achieve its intended objectives.

4. (A) Both A and R are true and R is the correct explanation of A.
Identifying and understanding the needs and expectations of interested parties is a core requirement of modern food safety management systems. Because these external and internal parties, such as regulatory bodies, customers, and suppliers, directly influence the ability to consistently deliver safe products and services, their specific requirements must be systematically determined and regularly reviewed.

5. (B) The assurance that food will not cause adverse health effects when prepared and consumed according to its intended use.
Under international standards, food safety represents the assurance that consuming a product will not lead to any harm or adverse health impacts. This concept relies on the proper preparation and consumption of the food based on its designated purpose, making hazard identification and control critical during every step of the manufacturing, packaging, and distribution processes.

6. (C) Organizational structure and allocation of roles
External issues affecting a food safety management system include factors outside the direct control of the organization, such as legal modifications, market shifts, or emerging biological pathogens. Conversely, internal issues encompass aspects inherent to the organization itself, including its internal governance, corporate culture, specific allocation of professional roles, technological capabilities, and available resources.

7. (A) P-II, Q-IV, R-I, S-III
The high-level structure of modern ISO management standards organizes requirements into specific logical clauses. Clause 4 focuses on determining the organizational context and interested parties. Clause 5 outlines the responsibilities and commitment of leadership. Clause 6 defines the planning activities for addressing risks and opportunities, while Clause 7 outlines the necessary support elements.

8. (A) The products, processes, and sites covered by the FSMS
The scope of a food safety management system must clearly define the boundaries and applicability of the system within the business. It must be maintained as documented information and explicitly state the specific products, processing activities, and physical manufacturing sites covered by the system to ensure clarity for internal operations and external certification auditors.

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package. Under HACCP and ISO standards, what must the plant do with the rejected product?
(A) Sell the affected package at a reduced discount price in local retail markets.
(B) Isolate the batch, locate the machinery source, correct the issue, and scrap the package.
(C) Manually extract the metallic nut and return the loose biscuits to the packaging line.
(D) Disregard the event as a minor isolated issue if no other packages are rejected.

134. What is the cause-and-effect relationship of using a sanitizer concentration that is significantly below the manufacturer's recommended level during a CIP process?
(A) It causes equipment corrosion and rapid degradation of rubber seals.
(B) It leads to the complete eradication of bacterial spores.
(C) Ineffective microbial reduction, potentially leading to unsafe food.
(D) It directly causes the precipitation of hard water minerals on the equipment.

135. Identify the incorrect pair regarding allergen management strategies:
(A) Dedicated equipment - Using separate lines for allergen and non-allergen products
(B) Labeling - Clearly declaring the presence of major allergens on the ingredient list
(C) Employee training - Educating staff on the dangers of allergen cross-contact
(D) Production scheduling - Running allergens first and non-allergens next without washing.

136. Consider the following statements regarding the Food Safety and Standards Act (FSSA), 2006:
I. It consolidated various older food laws like the PFA Act, 1954 and the FPO, 1955.
II. It established the Food Safety and Standards Authority of India (FSSAI).
III. It shifted the regulatory focus from prevention and food safety to mere adulteration checking.
IV. It provides a legal framework for the regulation of food manufacturing, storage, distribution, and sale in India.
Which of the above statements are correct?
(A) I, II and IV
(B) I, II and III
(C) II, III and IV
(D) I, III and IV

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137. The Food Safety and Standards Act (FSSA), 2006 was primarily enacted to consolidate laws relating to food and to establish the FSSAI. In which year were its major provisions and corresponding Rules/Regulations fully enforced across India?
(A) 2006
(B) 2008
(C) 2011
(D) 2018

138. Which of the following is a correct statement regarding the food recall procedure under Indian food law?
(A) Only the FSSAI can initiate a food recall; Food Business Operators (FBOs) are prohibited from voluntary recall.
(B) A food recall aims to remove unsafe food from the distribution chain and inform consumers.
(C) Recalled food products must be immediately repacked and sold in rural markets.
(D) Food recall regulations only apply to imported food products.

139. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R):
Assertion (A): Under the FSSA 2006, the Adjudicating Officer has the power to hold an inquiry for certain offences and impose penalties.
Reason (R): All offences under the FSSA 2006, including those resulting in death, are resolved by the Adjudicating Officer without involving standard judicial courts.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

140. How does the FSSA 2006 generally define 'Sub-standard' food?
(A) Food that is completely unsafe and contains lethal toxins.
(B) Food that is misbranded with a fake expiry date.
(C) Food that fails standards but is not unsafe.
(D) Food that contains extraneous matter like insects.

Reason (R): Both involve the transfer of a hazard to a food product, but cross-contact refers specifically to allergenic proteins, which are not destroyed by normal cooking temperatures, unlike most vegetative microbes.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

125. How is a 'Food Hazard' defined in the context of food safety management?
(A) The statistical probability and severity of a specific adverse health symptom occurring.
(B) Any extraneous substance that alters the natural taste or color of food products.
(C) The mechanical or electrical failure of critical food processing machinery.
(D) A biological, chemical, or physical agent in food that can cause adverse health effects.

126. Which of the following is NOT classified as a chemical hazard in food?
(A) Pesticide residues
(B) Cleaning and sanitizing agents
(C) Norovirus
(D) Histamine (Scombrotoxin)

127. Match the specific hazards (List I) with their respective categories (List II).
List I: (Specific Hazards)
P. Salmonella
Q. Lead contamination
R. Walnut fragments
S. Wood splinters
List II: (Categories)
I. Chemical hazard
II. Physical hazard
III. Biological hazard
IV. Allergenic hazard
(A) P-III, Q-I, R-IV, S-II
(B) P-I, Q-III, R-IV, S-II
(C) P-III, Q-IV, R-I, S-II
(D) P-IV, Q-I, R-II, S-III

128. A dairy processing plant needs to clean its enclosed, fixed pipelines. To demonstrate competency in modern sanitation, which method should the sanitation manager select?
(A) Clean-Out-of-Place (COP)
(B) Dry wiping with microfiber cloths
(C) Manual scrubbing with wire brushes
(D) Clean-In-Place (CIP)

129. Given below are two statements:
Statement I: Biofilms are complex communities of microorganisms attached to a surface and enclosed in an extracellular polymeric matrix.
Statement II: Biofilms are easily removed by standard water rinsing and do not pose a persistent contamination threat in food plants.
(A) Both Statement I and Statement II are true
(B) Both Statement I and Statement II are false
(C) Statement I is true but Statement II is false
(D) Statement I is false but Statement II is true

130. What is the most appropriate material for constructing primary food contact surfaces in a high-moisture processing environment?
(A) Untreated porous wood
(B) Standard galvanized iron
(C) Food-grade stainless steel
(D) Brittle acrylic plastic

131. A quality supervisor uses ATP (Adenosine Triphosphate) bioluminescence swabbing on a slicing machine immediately after the sanitation shift. The reading comes back exceptionally high. Applying this concept, what does this indicate, and what action should be taken?
(A) Organic residue remains; re-clean and sanitize before use.
(B) The machine is perfectly sterile; production can commence.
(C) The sanitizer concentration was too strong; rinse with water.
(D) The metal of the machine is corroding; replace the blade.

132. Which of the following statements regarding the hygienic design of food plant facilities is incorrect?
(A) Junctions between walls and floors should be coved (rounded) to facilitate cleaning.
(B) Lighting fixtures over food processing zones should be shatterproof or protected.
(C) Adequate ventilation is required to minimize airborne contamination and condensation.
(D) Floor drains should flow from low-risk areas to high-risk areas to conserve water.

133. During production, an in-line metal detector rejects a sealed package of biscuits. An investigation reveals a small steel nut inside the

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(D) Divide, seal, and dispatch the sample into four parts to the Food Analyst.

149. What is the direct legal effect if a Food Business Operator continues to operate without rectifying issues after their license has been suspended due to failure to comply with an improvement notice?
(A) The commercial operating license will be automatically upgraded.
(B) License cancellation and prosecution for operating without a license.
(C) The FBO receives a long-term exemption from future routine inspections.
(D) The operator is only required to pay a minor administrative late fee.

150. Identify the correct pair of statutory authorities under the FSSA 2006 and their jurisdiction:
(A) Food Safety Officer - Central authority residing in New Delhi shaping national policy
(B) Designated Officer - Village level worker responsible for agricultural extension
(C) Commissioner of Food Safety - State authority enforcing food safety laws
(D) Food Analyst - Authority responsible for judging civil disputes between food companies

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18. (C) It must commit to satisfy applicable food safety, statutory, and regulatory requirements.
The food safety policy, established by top management, serves as a formal commitment to the organization's safety goals. It must align with the strategic direction, provide a framework for setting safety objectives, and explicitly include a commitment to comply with applicable food safety, statutory, regulatory, and mutually agreed customer requirements, while being communicated at all levels.

19. (C) A is true but R is false.
Top management is responsible for ensuring that organizational roles, responsibilities, and authorities are defined and understood. This clear distribution is crucial for the overall effectiveness of the food safety management system. It ensures that personnel have the authority to initiate actions, report system performance, and handle critical safety issues, directly impacting product safety.

20. (D) A control measure essential to reduce a significant hazard to an acceptable level, managed by action criteria.
An operational prerequisite program is a control measure identified by hazard analysis as essential to manage the risk of significant food safety hazards. Unlike critical control points, which utilize strict critical limits, operational prerequisite programs are managed through specific action criteria and monitoring activities to demonstrate that the hazard is maintained at an acceptable level.

21. (B) Financial cost analysis of each control measure
The hazard control plan, which includes critical control points and operational prerequisite programs, is strictly a technical safety document. It must outline hazards, control limits, action criteria, monitoring procedures, and corrective actions. Financial considerations, budget projections, or cost analyses of specific control measures are not included in this operational food safety plan.

22. (A) P-II, Q-IV, R-I, S-III
In operational planning, different control elements serve distinct purposes. Prerequisite programs maintain general hygienic environments. Operational prerequisite programs are essential control measures managed through action criteria. Critical control points represent specific operational steps where control is essential to prevent hazards, managed by measurable critical limits, while hazard analysis is the overall risk assessment process.

23. (D) As a Critical Control Point (CCP)
A processing step designed specifically to eliminate or reduce a significant biological hazard to an acceptable level, where no subsequent step can mitigate the risk, must be classified as a critical control point. This classification requires the establishment of strict, measurable critical limits to ensure process control and prevent food safety failures.

24. (C) Statement I is true but Statement II is false
Critical limits at critical control points must be measurable to allow objective determination of compliance. Action criteria for operational prerequisite programs serve a similar function but can be either measurable or observable, such as checking the physical integrity of a filter, providing flexibility in monitoring diverse operational parameters across processing lines.

25. (A) IV, II, I, III
Conducting a structured hazard analysis requires a logical progression of steps. First, flow diagrams and process descriptions are prepared. Next, potential food safety hazards are identified. A comprehensive hazard assessment is then conducted to evaluate the severity and likelihood of occurrence. Finally, appropriate control measures are selected and categorized into operational programs.

26. (B) Handle the affected batch as potentially unsafe according to standard procedures.
When a monitored parameter at a critical control point fails to meet the established critical limit, control is lost, and the product must be treated as potentially unsafe. The affected batch must be immediately isolated, evaluated by competent personnel, and prevented from entering commerce until its safety can be objectively verified.

27. (A) Top management is explicitly prohibited from interacting with the food safety team.
Top management must actively support and interact with the food safety team to ensure the system is effective and properly resourced. The food safety team must be multidisciplinary, and the team leader is responsible for organizing, training, and guiding the team to establish,

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9. (C) Statement I is true but Statement II is false
Organizations must regularly review and update information regarding their interested parties and their requirements to maintain an effective safety system. However, the range of relevant interested parties is broad, extending well beyond direct customers to include regulatory authorities, suppliers, local communities, and internal employees, as all can influence food safety outcomes.

10. (A) II, IV, III, I
Establishing the context of an organization requires a structured process. It begins by identifying internal and external issues relevant to the management system. Next, the organization identifies relevant interested parties and determines their specific expectations and requirements. Finally, using this foundational information, the boundaries and applicability are analyzed to define the overall scope of the system.

11. (A) Context of the organization (external issues)
Fluctuations in municipal water quality represent an external factor originating outside the manufacturing facility's direct operational boundaries. Before developing prerequisite programs or operational plans, the organization must analyze such environmental and infrastructure issues under the context clause to identify potential risks to the system, enabling the formulation of proactive control measures.

12. (C) Correction and corrective action are synonymous terms indicating the elimination of the root cause of a nonconformity.
Under food safety terminology, correction and corrective action represent distinct concepts. A correction is an immediate reaction to eliminate an identified nonconformity, such as isolating a contaminated batch. Conversely, a corrective action involves a systematic investigation to identify, analyze, and eliminate the underlying root cause to prevent the recurrence of the nonconformity.

13. (D) Redefine and document the scope of the FSMS to cover the new processes.
When a food business introduces new processes or product lines, such as expanding from packaging into edible coatings, it must immediately update its documented scope. This ensures that the food safety management system accurately reflects the physical boundaries, hazard analyses, and prerequisite programs required to manage the unique risks associated with the newly introduced manufacturing activities.

14. (C) An FSMS that fails to ensure legal compliance, leading to potential penalties.
Statutory and regulatory authorities are critical interested parties in the food industry. Failing to identify and monitor their requirements means the organization may overlook mandatory legal obligations and updated safety codes. This omission directly leads to a non-compliant system, increasing the risk of producing unsafe products, regulatory violations, and severe legal or financial penalties.

15. (B) Interested party - Person or organization that can affect, be affected by, or perceive itself to be affected by a decision or activity
The vocabulary of international management standards precisely defines organizational roles and terms. An interested party includes any individual, group, or entity that can influence, be influenced by, or perceive themselves to be affected by the activities of the business. Properly identifying these parties allows the organization to systematically address their needs and expectations.

16. (B) I, III and IV
Prerequisite programs establish the baseline environmental and hygienic conditions necessary for safe operations. When selecting these programs, organizations must carefully consider applicable statutory, regulatory, and customer requirements. Hazard analysis must precede the categorization of control measures, and the overall food safety plan must encompass both hazard control plans and basic operational prerequisite programs.

17. (B) Clause 5
Clause 5 of the ISO 22000:2018 standard focuses on leadership and commitment. This clause mandates that top management demonstrate active leadership by taking responsibility for the effectiveness of the system, establishing a clear food safety policy, and ensuring that organizational roles, responsibilities, and authorities are properly assigned and communicated throughout the company.

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(A) Performing daily applications of chemical pesticides regardless of actual pest activity.
(B) Controlling rodent pests while permitting natural insect predators to remain in the plant.
(C) Integrating exclusion, sanitation, and targeted controls to manage pests safely.
(D) Restricting pest management activities to using electronic bug traps in processing halls.

109. Given below are two statements, one labeled as Assertion (A) and the other labeled as Reason (R):
Assertion (A): Food handlers must thoroughly wash their hands after using the toilet, handling raw food, or handling garbage.
Reason (R): Hands are a major vehicle for transferring pathogenic microorganisms from contaminated sources to ready-to-eat food.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

110. In the context of food plant operations, how is 'Sanitation' technically defined?
(A) The application of thermal sterilization to completely destroy all microbial life on surfaces.
(B) The regular maintenance of walls by applying chemical coatings with antimicrobial elements.
(C) Maintaining clean and hygienic conditions, typically through cleaning and disinfection.
(D) The mechanical separation of all potential foreign physical particles using screens and magnets.

111. Which of the following is an exception to the acceptable personal habits required in a food manufacturing facility?
(A) Covering open wounds with bright, highly visible waterproof dressings.
(B) Sneezing into hands and returning directly to food handling.
(C) Maintaining short, clean, and completely unpolished fingernails.
(D) Removing all protective aprons before entering a public restroom.

112. Match the common food plant pests (List I) with their primary evidence or control method (List II).
List I: (Common Food Plant Pests)
P. Rodents
Q. Cockroaches
R. Stored Product Insects (e.g., weevils)
S. Flies
List II: (Primary Evidence or Control Method)
I. Pheromone traps and fumigation
II. UV light traps and positive air pressure
III. Droppings, gnaw marks, and bait stations
IV. Fecal smears, egg casings (oothecae) in dark crevices
(A) P-III, Q-IV, R-I, S-II
(B) P-IV, Q-III, R-I, S-II
(C) P-III, Q-I, R-IV, S-II
(D) P-I, Q-IV, R-II, S-III

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113. A VIP delegation is visiting a high-risk dairy processing area. To demonstrate competency in enforcing FSSAI hygiene standards, the plant manager must:
(A) Enforce standard protective clothing, hairnets, and hand hygiene.
(B) Bypass the standard sanitation rules as a sign of respect toward foreign guests.
(C) Permit unrestricted entry to the area while advising guests to avoid contact with food.
(D) Mandate only basic hair cover while ignoring other protective apparel requirements.

114. Given below are two statements:
Statement I: Under IPM principles, toxic rodenticide baits can be freely placed inside food production areas to control mice.
Statement II: Inside food processing areas, only mechanical traps or non-toxic monitoring blocks should be used to prevent chemical contamination of food.
(A) Both Statement I and Statement II are true
(B) Both Statement I and Statement II are false
(C) Statement I is false but Statement II is true
(D) Statement I is true but Statement II is false

115. What is the most appropriate reason for conducting mandatory medical screenings of food handlers under FSSAI regulations?
(A) To verify they do not carry any infectious diseases transmissible via food.
(B) To evaluate their general muscular strength and capacity for heavy manual labor.
(C) To determine their direct qualification for

implement, and continually maintain the overall safety management system.

28. (C) Because the operator must evaluate the cause and take corrective action to prevent recurrence.
When an operational prerequisite program fails to meet its established action criteria, simply removing the affected package is insufficient. The standard requires that the operator isolate the affected product, evaluate the underlying cause of the failure, and implement appropriate corrective actions to eliminate the root cause and prevent the issue from recurring in future production.

29. (D) Failure to effectively implement and maintain the FSMS.
Developing and sustaining an effective food safety management system requires adequate resources, including trained personnel, modern infrastructure, and appropriate monitoring equipment. If top management fails to allocate these resources during the planning phase, the system will degrade, leading to poor implementation, unmonitored hazards, and failure to maintain safety standards.

30. (C) Top management - Establishing the food safety policy
Under standard management system structures, top management holds the ultimate responsibility for directing the organization. This responsibility includes establishing the food safety policy, ensuring that objectives are aligned with strategic goals, and allocating resources. Operational staff, team leaders, and internal auditors execute specific monitoring and evaluation tasks within this established framework.

31. (B) I, II and IV
Performance evaluation involves conducting internal audits at planned intervals, evaluating the performance of external providers during management reviews, and ensuring the food safety team analyzes verification data. Continual improvement is a constant requirement designed to enhance the overall system and is not restricted to reacting only when major nonconformities are identified.

32. (C) Clause 9
Clause 9 of the ISO 22000:2018 standard focuses on performance evaluation. This clause details the requirements for monitoring, measurement, analysis, and evaluation, including conducting internal audits and executing structured management reviews, ensuring that top management has objective data to assess the continuing suitability and effectiveness of the system.

33. (A) To evaluate the FSMS to ensure its continuing suitability, adequacy, and effectiveness.
The primary purpose of the management review is for top management to systematically evaluate the food safety management system. This process ensures that the system remains suitable, adequate, and effective in achieving its goals, while aligning with the strategic direction and identifying opportunities for continual improvement based on comprehensive operational data.

34. (A) Both A and R are true and R is the correct explanation of A.
Continual improvement is a core requirement of modern management standards. Because the standard utilizes the Plan-Do-Check-Act cycle at both organizational and operational levels, it creates a structured loop where performance is monitored, verified, and analyzed, directly driving ongoing adjustments that enhance the overall capability and effectiveness of the system.

35. (A) Obtaining evidence that a control measure is capable of effectively controlling the hazard.
Validation is the process of obtaining objective evidence prior to the implementation of control measures to demonstrate that they are capable of achieving the desired level of hazard control. This scientific assessment ensures that parameters like thermal holding times and temperatures will successfully eliminate biological pathogens before operations begin.

36. (D) The daily attendance records of administrative staff
Management review meetings require specific inputs regarding the performance of the system, such as audit results, feedback from interested parties, resource adequacy, and the status of corrective actions. Irrelevant administrative information, such as the daily attendance logs of non-operational staff, does not contribute to evaluating safety compliance and is excluded.

37. (A) P-II, Q-III, R-I, S-IV
Evaluation activities must be conducted at distinct operational phases. Monitoring involves real-time measurements to assess if a process is operating

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significant supply chain risk. Under quality guidelines, the organization should proactively identify and qualify alternative suppliers as a documented contingency to ensure long-term business continuity.

57. (B) It treats every department as an isolated entity with independent goals.
The process approach in quality management emphasizes understanding and managing interrelated activities as a cohesive system. It discourages treating departments as isolated silos with independent goals. Instead, it promotes collaboration, clarifies resource interactions, and ensures that all departments align their efforts to deliver consistent, predictable, and high-quality results.

58. (B) Corrective action procedure
When a significant quality or safety failure occurs, such as a customer finding a foreign object in a beverage, it triggers the corrective action procedure. This process requires the organization to investigate the issue, determine the root cause, implement measures to eliminate the cause, and review the effectiveness of the action to prevent recurrence.

59. (A) Intuition-based decisions leading to inconsistent quality and unresolved issues.
The principle of evidence-based decision making dictates that decisions must be based on the analysis and evaluation of reliable data. Failing to apply this principle leads to reliance on subjective intuition or guesswork. This often results in inconsistent product quality, operational inefficiencies, and an inability to resolve root causes of recurring problems.

60. (C) Engagement of people - Utilizing employee competence to enhance value
Engaging people is a fundamental principle of quality management. It emphasizes that competent, empowered, and engaged employees at all levels are essential to enhance the organization's capability to create and deliver value. This involvement fosters ownership, drives innovation, and supports the successful implementation and maintenance of the quality management system.

61. (B) I, III and IV
Total Quality Management is an organization-wide management philosophy focused on integrating quality into every business activity. It prioritizes customer satisfaction and promotes the continuous improvement of all processes. It emphasizes that quality is a shared responsibility of all departments and employees, rather than being restricted to the quality control department alone.

62. (C) Japan
The term 'Kaizen' refers to the philosophy of continuous improvement, focusing on small, incremental, and positive changes over time. This foundational element of Total Quality Management originated in Japan, where it was extensively developed and adopted by manufacturing industries post-World War II to achieve high quality and operational efficiency.

63. (B) A management approach focused on long-term success through customer satisfaction and staff participation.
Total Quality Management is a comprehensive management approach focused on achieving long-term organizational success. This is accomplished by prioritizing total customer satisfaction and encouraging the active participation of all employees across all levels of the company in improving operational processes, products, services, and the overall corporate culture.

64. (A) Both A and R are true and R is the correct explanation of A.
Employee empowerment and involvement are critical for the successful implementation of quality programs. Employees who perform the daily operational tasks are closest to the processes and possess valuable insights. Empowering these workers allows the organization to quickly identify inefficiencies, detect safety hazards, and implement practical improvements that enhance overall quality.

65. (A) A method targeting 3.4 defects per million opportunities.
Six Sigma is a highly disciplined, data-driven methodology used in quality management to eliminate defects in any process. It targets a statistical threshold of six standard deviations between the mean and the nearest specification limit, translating to no more than 3.4 defective outputs per million opportunities, thereby ensuring extreme consistency.

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47. (B) Meeting customer, statutory, and regulatory requirements consistently.
Unlike food safety standards that focus specifically on eliminating physical, chemical, and biological hazards, the primary objective of ISO 9001:2015 is general quality management. It aims to help organizations consistently provide products and services that meet customer expectations alongside applicable statutory and regulatory requirements, driving overall organizational efficiency and customer satisfaction.

48. (D) Considering risks and opportunities in QMS processes to drive improvement.
Risk-based thinking involves a proactive approach to quality management. Rather than treating risk as a separate, isolated activity, it requires organizations to systematically consider potential risks and opportunities across all processes. This integration helps prevent undesirable outcomes, ensures resource optimization, and drives continual improvement throughout the quality management system.

49. (A) Both A and R are true and R is the correct explanation of A.
The process approach is fundamental to implementing an effective quality management system. By viewing the organization as a network of interrelated processes, management can better understand how inputs, activities, and outputs interact. This systematic management enhances efficiency, provides predictable results, and allows the organization to optimize performance across different functional departments.

50. (C) Procedures and responsibilities for achieving quality objectives.
A quality management system formalizes the specific procedures, responsibilities, and workflows required to achieve quality objectives. It provides a structured framework that guides personnel in maintaining consistent standards, optimizing operational processes, and meeting customer expectations, rather than focusing on financial accounting or corporate marketing communication campaigns.

51. (A) Profit maximization
The ISO 9001:2015 standard is based on seven defined quality management principles: customer focus, leadership, engagement of people, process approach, improvement, evidence-based decision making, and relationship management. While financial viability is important for any business, profit maximization is a commercial goal and is not classified as a quality management principle.

52. (A) P-III, Q-IV, R-I, S-II
The Plan-Do-Check-Act cycle is a structured methodology for process control and improvement. The planning stage involves setting quality objectives and determining necessary resources. The doing stage implements the planned processes. The checking stage monitors and measures performance against policies, while the acting stage takes necessary actions to continually improve system performance.

53. (B) Investigate and implement alternative packaging that balances safety and usability.
Applying the customer focus principle requires an organization to understand and meet customer needs and expectations. When customers report packaging difficulties, a quality-focused organization must investigate the feedback. The competent response is to develop alternative packaging solutions that maintain necessary food safety barriers while improving usability for the end consumer.

54. (D) Statement I is false but Statement II is true
The ISO 9001:2015 standard does not contain a separate, standalone clause for preventive action, which was present in older versions. Instead, the concept of prevention is integrated throughout all requirements of the updated standard through risk-based thinking, requiring organizations to proactively address risks and opportunities during the operational planning stages.

55. (A) I, II, IV, III
Implementing the process approach under quality management guidelines requires a structured progression. The process begins by determining the required inputs and expected outputs. Next, the sequence and interaction of these processes are mapped. Responsibilities and authorities are then assigned, followed by ongoing evaluation and modification to ensure the processes achieve intended results.

56. (B) Suspend all manufacturing operations until a new source is qualified.
Risk-based thinking requires identifying operational vulnerabilities before they cause actual disruption. Relying on a single supplier for a key ingredient like specialized flour is a

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as intended. Verification occurs during or after an activity to confirm that objectives were achieved. Validation gathers scientific evidence of capability before implementation, and system updating modifies the system using new performance data.

38. (C) Identify the root cause, evaluate product safety, and implement corrective actions.
When a nonconformity like missing process temperature logs is discovered, the organization must act systematically. It must first control the issue and evaluate the safety of the affected product batches. Next, a root cause analysis must be conducted to understand the failure, followed by implementing appropriate corrective actions to prevent recurrence.

39. (C) Statement I is true but Statement II is false
Both ISO 9001 and ISO 22000 share the High-Level Structure based on Annex SL, ensuring consistent clause structures and terminology. However, they address entirely different operational areas, with quality management focusing on customer satisfaction and food safety focusing on hazard control. Compliance with one does not automatically guarantee compliance with the other.

40. (B) II, I, III, IV
Managing a nonconformity requires a logical progression. The process begins with reviewing the nonconformity to understand the issue. Next, the organization evaluates the need for action to eliminate the underlying root cause. The required action is then implemented, and finally, the effectiveness of the corrective action is reviewed to ensure the problem is solved.

41. (B) Implement a preventive maintenance schedule and update the FSMS.
When a repeated physical defect like package seal failure is linked to a degrading heating element, the system must focus on prevention. Implementing a regular preventive maintenance schedule addresses the root cause of the equipment wear. Documenting this update in the safety management system ensures long-term process control and prevents defective products.

42. (B) Uncalibrated equipment may be used if the operator believes it is accurate.
Monitoring and measuring equipment used at critical control points must be calibrated or verified at specified intervals against international standards. Using uncalibrated equipment based on operator assumptions is strictly prohibited, as it compromises data integrity, prevents accurate hazard monitoring, and increases the risk of releasing contaminated or unsafe food products to consumers.

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43. (A) Auditors must act objectively and impartially during the audits.
Internal audits must be conducted in an objective and impartial manner to ensure the integrity of the evaluation. Allowing managers to audit their own departments violates this principle because it introduces conflicts of interest. Auditors must be independent of the specific activity being audited to provide an unbiased assessment of the system.

44. (C) Loss of control over hazards, potentially releasing unsafe food.
Using an uncalibrated thermometer at a critical cooking step introduces the risk of inaccurate temperature readings. If the actual temperature is lower than the displayed value, biological pathogens may survive the process. This failure represents a loss of process control, directly leading to the potential release of unsafe food products to the market.

45. (D) Validation - Modifying the policy after an outbreak
Performance evaluation terms must be used accurately. Internal audits assess system compliance, management reviews evaluate overall performance, and data analysis reviews trends. However, validation involves obtaining scientific evidence of a control measure's capability prior to its implementation. Modifying a policy after a safety incident is a corrective or system update activity.

46. (B) I, III and IV
The ISO 9001:2015 standard is built upon seven quality management principles, applies to all sectors including service and manufacturing, promotes the process approach with the Plan-Do-Check-Act cycle, and integrates risk-based thinking. This framework enables organizations to determine potential risks and opportunities, ensuring consistent quality and enhanced customer satisfaction.

66. (C) Synergize (Soji)
The 5S methodology is a systematic framework for workplace organization and standardization. It consists of five Japanese terms: Seiri (Sort), Seiton (Set in order), Seiso (Shine/Sweep), Seiketsu (Standardize), and Shitsuke (Sustain). The term 'Synergize' is not a component of this visual management system, although cooperation is required to maintain the system.

67. (A) P-III, Q-IV, R-I, S-II
The 5S methodology utilizes five structured steps to optimize the workplace. Seiri translates to sorting and removing unnecessary items. Seiton involves setting necessary items in order for easy access. Seiso focuses on shining or sweeping the work environment to maintain cleanliness, while Shitsuke represents sustaining these habits through discipline and regular audits.

68. (D) Redesigning process flows to eliminate material waste and unnecessary handling.
Lean manufacturing focuses on maximizing customer value while minimizing waste. To implement these principles effectively, a supervisor must identify and eliminate non-value-added activities. Redesigning process flows to reduce material waste, minimize product handling, and optimize worker movement directly supports lean goals, improving operational efficiency and lowering processing costs.

69. (A) Both Statement I and Statement II are true
Traditional quality control is retrospective, focusing primarily on inspecting and detecting defects in finished products at the end of the production line. In contrast, Total Quality Management represents a proactive, holistic approach that shifts the focus toward preventing defects by continuously improving the processes and systems that create the products.

70. (A) III, I, IV, V, II
The Six Sigma DMAIC methodology follows a rigorous, five-step sequential process. It begins by defining the problem or project goals. Next, process performance is measured. The collected data is then analyzed to determine the root causes of defects. The process is improved by eliminating those defects, and finally, controls are established to maintain the improvements.

71. (D) Clear out all obsolete, damaged, and unneeded materials.
The first step of the 5S methodology, Sort (Seiri), requires separating necessary items from unnecessary ones. In a packaging storage area, implementing this step involves identifying, red-tagging, and clearing out all obsolete, damaged, or unneeded materials. This action frees up valuable space, reduces clutter, and ensures only essential items remain.

72. (A) It requires substantial capital investment for every improvement made.
Kaizen is characterized by making small, incremental, and continuous improvements rather than relying on massive, expensive technological overhauls. It engages employees at all levels to identify simple, low-cost solutions to daily operational problems. This approach fosters a culture of shared responsibility and continuous improvement without requiring substantial capital investments.

73. (B) Analyze process variation with statistical tools and calibrate the machine.
Addressing process inconsistencies under Total Quality Management requires a scientific approach. Rather than merely discarding defective products or adjusting specifications, the organization must analyze process variation using statistical tools. Identifying the root cause of the variation, such as calibrating the filling machinery, ensures stable process control and consistent product quality.

74. (B) The program will fail due to lack of support, direction, and resources.
The active commitment and visible support of top management are essential for the long-term success of any quality improvement program. Without executive leadership, quality initiatives lack strategic direction, proper resource allocation, and organizational alignment. Consequently, employee motivation declines, and the program will fail to achieve its intended improvements.

75. (A) Philip Crosby - Invention of the Six Sigma statistical threshold
While Philip Crosby is renowned for his "Zero Defects" philosophy and the "Quality is Free" concept, he did not invent Six Sigma. The Six Sigma statistical methodology was developed by engineers at Motorola in the 1980s. Other gurus like Deming, Juran, and Ishikawa made

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which can compromise product authenticity and pose significant health risks to consumers.

96. (D) Cross-contact with allergens
Food fraud encompasses intentional deceptive practices for economic gain, including counterfeiting brands, diluting premium ingredients, or using unapproved chemical enhancements. Allergen cross-contact is an operational food safety hazard resulting from unintentional process contamination. It is managed through general sanitation and prerequisite programs rather than fraud mitigation plans.

97. (A) P-III, Q-I, R-II, S-IV
Different food fraud categories involve specific deceptive techniques. Substitution replaces high-value ingredients with cheaper alternatives. Dilution mixes premium liquids with lower-value liquids to increase volume. Concealment hides the inferior quality of a product, while counterfeiting involves copying brand packaging and names to mislead consumers about the product's actual origin.

98. (C) Assessing the supply chain for economic vulnerabilities to prevent adulteration.
Vulnerability Assessment and Critical Control Points focuses specifically on food fraud mitigation. To protect against economic adulteration, a quality manager must analyze supply chain vulnerabilities, assess supplier reliability, monitor market price spikes, and establish controls to prevent fraudulent activities, rather than focusing on routine microbiological hygiene or sanitation testing.

99. (C) Statement I is true but Statement II is false
Adding melamine to dairy products to artificially increase nitrogen levels is a classic example of economically motivated adulteration. Although driven by economic profit, such fraudulent practices can cause catastrophic public health crises, as evidenced by severe illness and death in consumers, demonstrating that food fraud is a critical food safety concern.

100. (D) Because NABL accreditation formally recognizes laboratory competence, ensuring accuracy.
Utilizing an NABL-accredited laboratory for testing ensures that the facility has undergone rigorous assessment by an authoritative body. This accreditation formally recognizes the laboratory's technical competence, adherence to international standards, and the overall accuracy of its analytical results, providing confidence to food manufacturers, regulatory authorities, and final consumers.

101. (B) Stable Isotope Ratio Mass Spectrometry (IRMS)
Detecting the dilution of premium honey with corn or cane syrups requires advanced analytical techniques. Stable Isotope Ratio Mass Spectrometry is highly effective because it measures the precise ratio of stable carbon isotopes. This analysis can distinguish between C3 plants, like flowers, and C4 plants, like corn, revealing fraudulent adulteration.

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102. (C) NABL provides ISO 22000 certification directly to food manufacturing companies.
Accreditation and certification are distinct processes. Certification is a third-party assurance that an organization conforms to specific management standards. Accreditation is the formal recognition of competence to perform specific tasks, such as testing. NABL accredits laboratories for testing and calibration; it does not issue ISO 22000 certifications to food manufacturing companies.

103. (D) Mislabelling and Substitution
Substituting premium olive oil with cheaper refined hazelnut oil while retaining the original premium label is a clear instance of food fraud. It combines ingredient substitution to reduce material costs and deliberate mislabeling to deceive consumers about the product's identity, representing a clear act of economic adulteration.

104. (A) Market scarcity and high prices increase the economic incentive for adulteration.
Global market dynamics directly influence the risk of food fraud. When premium ingredients experience market scarcity, crop failures, or high prices, the profit margin for adulteration increases significantly. Under these economic conditions, unscrupulous actors are more motivated to dilute, substitute, or counterfeit high-value products to maximize their financial returns.

105. (B) Sensory Evaluation - Detecting heavy metal contamination in spices
Analytical strategies must match the specific hazard being analyzed. DNA barcoding identifies species substitution, and chromatography detects

86. (C) Apply corrective actions and submit evidence to the auditor for verification.
A major non-conformance indicates a significant breakdown in process control, such as a failure to monitor a critical control point. Under certification rules, the organization cannot achieve certification until the non-conformance is resolved. It must implement corrective actions, determine the root cause, and submit verified evidence of compliance to the auditor.

87. (D) ISO delegates the authority to issue certificates to national governments.
The International Organization for Standardization is an independent, non-governmental organization that develops and publishes international standards. ISO itself does not perform audits, issue certificates, or delegate certification authority to national governments. Certification activities are carried out by independent, third-party certification bodies accredited by national accreditation boards.

88. (A) The company must implement new rules and be audited within a set transition window.
When an ISO standard is revised, such as the update to ISO 22000:2018, certified organizations must align their systems with the new requirements. This transition is not automatic. The organization must update its processes, implement the new rules, and undergo a successful transition audit conducted by their certification body within a specified timeframe.

89. (B) The certification body will suspend or withdraw the ISO certificate.
Sustaining certification requires maintaining system compliance. If an organization consistently fails surveillance audits or neglects to address identified major non-conformities, it violates the certification agreement. Consequently, the certification body will suspend or formally withdraw the ISO certificate, resulting in the immediate loss of certified status and potential market access.

90. (B) Audit criteria - The reference policies or requirements used to compare audit evidence
Audit terminology must be precisely understood for conducting effective evaluations. Audit criteria represent the reference policies, procedures, or requirements used as a benchmark against which audit evidence is compared. Audit evidence includes verifiable records or statements of fact, while a nonconformity represents the non-fulfillment of a specified requirement.

91. (A) I, II and III
The National Accreditation Board for Testing and Calibration Laboratories provides accreditation to laboratories, while the National Accreditation Board for Hospitals & Healthcare Providers accredits healthcare facilities. Both are constituent boards of the Quality Council of India. Laboratory accreditation is voluntary and is not a mandatory requirement for all primary agricultural farms.

92. (C) National Accreditation Board for Testing and Calibration Laboratories
The acronym NABL stands for the National Accreditation Board for Testing and Calibration Laboratories. Operating as an autonomous body under the Quality Council of India, NABL provides formal accreditation to testing, calibration, and medical laboratories, verifying their technical competence and ensuring the reliability of analytical results.

93. (D) Accrediting healthcare facilities to improve patient safety and care quality.
The National Accreditation Board for Hospitals & Healthcare Providers focuses on the healthcare sector. Its primary scope is to establish and operate accreditation programs for hospitals and healthcare facilities. This process aims to systematically improve patient safety, enhance the quality of healthcare delivery, and drive continuous improvement in clinical operations.

94. (D) A is false but R is true.
Economically Motivated Adulteration is driven by financial gain rather than an intent to cause public health harm. Perpetrators aim to reduce production costs or inflate product value. However, because food safety controls are bypassed and unapproved or toxic substances may be introduced, these fraudulent activities can lead to severe public health consequences.

95. (B) The intentional substitution or tampering of food products for economic gain.
Food fraud is defined as the deliberate and intentional substitution, addition, tampering, or misrepresentation of food, ingredients, or packaging concepts for economic gain. Unlike accidental contamination, food fraud involves conscious deception to increase profit margins,

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cholera, or hepatitis A. This screening prevents infected personnel from handling food, reducing the risk of wide-scale foodborne illness outbreaks.

116. (D) Document the pest sighting, seal cracks, clean the area, and contact pest control.
An integrated pest management response to a pest sighting involves structured operational steps. The supervisor must document the event, clean any organic residues that could serve as food, seal structural cracks to prevent harborages, and coordinate with pest control professionals to apply targeted treatments, rather than immediately spraying broad-spectrum chemical pesticides.

117. (B) Pockets above the waist are recommended to hold pens and small tools.
Hygienic design of protective clothing minimizes potential physical contamination risks. Pockets located above the waist are discouraged in food plants because items like pens or thermometers can easily fall out and contaminate product streams. Lab coats should utilize snap fasteners or Velcro instead of buttons, and have no breast pockets.

118. (C) Exclude the employee from food areas until cleared by a doctor.
Hepatitis A is a highly infectious viral pathogen transmissible through food via the fecal-oral route. Under food hygiene regulations, any employee diagnosed with jaundice or Hepatitis A must be immediately excluded from all food handling and storage areas. The employee cannot return to work until obtaining a formal medical clearance from a physician.

119. (D) Leaving gaps under doors and unmeshed windows leads to increased pest entry.
Facility design directly impacts the effectiveness of pest control. Leaving physical gaps under exterior doors or failing to install mesh screens on windows provides open entry points for pests like rodents and flying insects. Proper maintenance, including installing door sweeps and mesh screens, is essential to establish physical barriers against pest intrusion.

120. (A) Contact plate (RODAC) - Enumerates viable microbial colonies on flat surfaces
Contact plates, such as RODAC plates, are specialized microbiological tools containing nutrient agar. They are pressed directly onto flat equipment surfaces to sample and enumerate viable microbial colonies, providing quantitative data to verify sanitation effectiveness. Other tools like ATP swabs measure total organic residue rather than specific viable bacterial counts.

121. (A) I, II and III
Food safety hazards are classified into biological, chemical, and physical categories. Biological hazards include pathogens like bacteria, viruses, and parasites. Chemical hazards encompass pesticides, sanitizers, and natural toxins like aflatoxins. Physical hazards are extraneous materials like glass or metal. Allergens represent a specific immunological risk and are categorized as chemical hazards.

122. (B) Peanuts
Major food allergens are specific proteins that trigger severe immunological reactions in sensitive individuals. Global food safety standards and FSSAI regulations mandate clear labeling for major allergens, including peanuts, tree nuts, milk, eggs, soy, wheat, fish, and shellfish, to prevent accidental consumption and ensure consumer safety.

123. (A) Food contact surfaces must be smooth, non-absorbent, and corrosion-resistant.
Hygienic design principles prevent microbial harborage and facilitate effective cleaning. Food contact surfaces must be constructed from smooth, non-absorbent, and corrosion-resistant materials, such as food-grade stainless steel. Equipment must avoid sharp internal corners, dead ends, or exposed fasteners that can trap organic matter and foster biofilm development.

124. (D) A is false but R is true.
While both cross-contamination and cross-contact involve the transfer of undesirable elements, they are distinct safety concepts. Cross-contamination refers to the transfer of biological pathogens, which can often be destroyed by thermal processing. Cross-contact refers to the transfer of allergenic proteins, which are highly heat-stable and cannot be eliminated by standard cooking.

125. (D) A biological, chemical, or physical agent in food that can cause adverse health effects.
Under food safety management frameworks, a hazard is defined as any biological, chemical, or physical agent present in food, or condition of food, with the potential to cause adverse health effects. Properly identifying these specific agents during

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unapproved chemical additives. Sensory evaluation is useful for general organoleptic quality, but it cannot detect heavy metals like lead in spices, which requires complex instrumental methods like atomic absorption spectroscopy.

106. (A) I, II and IV
Under FSSAI Schedule 4 regulations, food handlers must wear clean protective clothing, undergo annual medical examinations, and receive vaccinations against enteric diseases. Wearing jewelry, watches, or pins is strictly prohibited in food processing zones because these items present physical contamination risks and can harbor biological pathogens.

107. (A) Spitting, smoking, or chewing tobacco
FSSAI guidelines mandate strict behavioral controls for food handlers within food preparation and processing areas. Activities like spitting, smoking, or chewing tobacco are strictly prohibited because they can easily transfer pathogenic bacteria or physical contaminants to food contact surfaces, packaging materials, and raw ingredients, compromising overall safety.

108. (C) Integrating exclusion, sanitation, and targeted controls to manage pests safely.
Integrated Pest Management is a comprehensive, proactive strategy designed to manage pest populations safely and effectively in food processing facilities. It relies on a combination of physical exclusion, strict sanitation, and routine monitoring to prevent infestations. Chemical pesticides are only used as a targeted, last resort to minimize chemical contamination risks.

109. (A) Both A and R are true and R is the correct explanation of A.
Mandatory handwashing protocols are critical because hands are a primary vehicle for cross-contamination. Pathogens from high-risk sources like restrooms, raw ingredients, or waste can easily adhere to skin. Thoroughly washing hands with soap and warm water removes these microorganisms, preventing their transfer to ready-to-eat foods during processing.

110. (C) Maintaining clean and hygienic conditions, typically through cleaning and disinfection.
In food plant operations, sanitation represents the systematic maintenance of clean and hygienic environmental conditions. This process involves two distinct steps: cleaning, which physically removes visible dirt, soil, and organic residues, and disinfection or sanitizing, which uses heat or chemical agents to reduce microscopic microbial populations to safe levels.

111. (B) Sneezing into hands and returning directly to food handling.
Hygienic practices require food handlers to prevent biological contamination. Sneezing directly into hands transfers pathogens like Staphylococcus aureus from nasal passages to skin. Returning directly to food handling without immediate washing and sanitizing violates basic safety rules, as it can transfer these pathogens directly onto food products and contact surfaces.

112. (A) P-III, Q-IV, R-I, S-II
Pest control programs must utilize species-specific monitoring and control methods. Rodent presence is detected via droppings and gnaw marks, managed with exterior bait stations. Cockroaches leave fecal smears and egg casings in dark crevices. Stored product insects are monitored with pheromone traps, while flying insects are controlled using UV light traps.

113. (A) Enforce standard protective clothing, hairnets, and hand hygiene.
Food safety regulations apply uniformly to all individuals entering high-risk processing zones, including visitors and VIP delegations. To protect products from biological or physical contamination, the facility manager must enforce standard hygiene protocols, requiring all visitors to wear clean protective clothing, hairnets, and appropriate footwear before entering the area.

114. (C) Statement I is false but Statement II is true
Under Integrated Pest Management guidelines, placing toxic chemical baits inside food handling areas is prohibited because it presents a high risk of accidental product contamination. Control methods inside processing zones must be restricted to mechanical traps, glue boards, or non-toxic monitoring blocks, ensuring that physical pests are captured without introducing chemical hazards.

115. (A) To verify they do not carry any infectious diseases transmissible via food.
Mandatory medical screenings for food handlers under FSSAI regulations aim to identify active infections or carrier states of specific diseases that can be transmitted through food, such as typhoid,

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foundational contributions that shaped modern quality management.

76. (B) I, II and IV
The ISO certification process requires an organization to conduct an internal audit and management review before the Stage 2 audit. A third-party certification body assesses compliance with the standard, and surveillance audits are conducted periodically. ISO itself is a standard-setting body and does not issue certificates directly to organizations.

77. (C) Annually (at least once a year)
Once an organization achieves formal certification, the certification body conducts periodic audits to verify that the management system remains compliant and effective. The standard frequency for these surveillance audits is annually, meaning they are conducted at least once a year during the three-year validity period of the certificate.

78. (C) 3 years
An ISO management system certificate, such as ISO 9001 or ISO 22000, has a standard validity period of three years. To maintain this certification, the organization must undergo annual surveillance audits, followed by a comprehensive recertification audit before the end of the third year to formally renew the certificate.

79. (A) Both A and R are true and R is the correct explanation of A.
The Stage 1 audit serves as a critical preliminary step in the certification process. During this phase, the auditor reviews the organization's documented information to assess its alignment with the standard and evaluates overall readiness. This assessment identifies potential gaps, ensuring the organization is prepared before proceeding to the Stage 2 audit.

80. (D) A systematic method to eliminate waste (Muda) without reducing productivity.
Lean manufacturing is a systematic operational methodology focused on identifying and eliminating non-value-added activities, known as waste or Muda. By streamlining processes, optimizing resource utilization, and improving workflow, lean principles enable organizations to deliver high-quality products efficiently without reducing overall productivity or compromising food safety standards.

81. (A) Value-added processing
Lean manufacturing categorizes operations into value-added and non-value-added activities. Non-value-added activities are classified as waste, which includes overproduction, waiting, unnecessary transportation, inappropriate processing, excess inventory, unnecessary motion, and defects. Value-added processing represents activities that transform materials into products that customers are willing to pay for, and is not waste.

82. (A) P-II, Q-IV, R-I, S-III
Audits are categorized based on the relationship between the auditor and the auditee. First-party audits are internal self-assessments. Second-party audits are conducted by an actual customer on a supplier to verify compliance. Third-party audits are conducted by independent, accredited certification bodies, while recertification audits are performed to renew an expiring certificate.

83. (A) The FSMS is fully implemented, with completed records, audits, and reviews.
The Stage 2 audit evaluates the actual implementation and effectiveness of the management system. To demonstrate competency, the organization must prove that all safety policies, processes, and hazard control plans are active. This requires presenting completed monitoring logs, internal audit reports, and management review records to the audit team.

84. (A) Both Statement I and Statement II are true
The conformity assessment infrastructure relies on a clear hierarchy of authority. Certification bodies are responsible for auditing individual organizations against specific standards and issuing certificates. To ensure impartiality and competence, these certification bodies are assessed and accredited by independent national accreditation bodies, establishing trust in the certification process.

85. (B) To verify that the certified system remains maintained and effective over time.
Surveillance audits are periodic assessments conducted after initial certification to ensure the organization maintains its management system. The primary goal is to verify that the system remains fully operational, continues to meet the standard's requirements, and is being effectively updated, rather than conducting a complete re-evaluation of every single clause.

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hazard analysis is critical to establishing effective preventive controls and ensuring consumer safety.

126. (C) Norovirus
Norovirus is an infectious viral agent that causes gastroenteritis, classifying it as a biological hazard rather than a chemical one. In contrast, chemical hazards encompass toxic non-biological substances, including pesticide residues, cleaning and sanitizing agents, mycotoxins like aflatoxin, and naturally occurring biogenic amines like histamine. These distinct categories require different control measures.

127. (A) P-III, Q-I, R-IV, S-II
Specific food safety hazards require accurate classification. Salmonella is a pathogenic bacterium and represents a biological hazard. Lead is a toxic heavy metal, classifying it as a chemical hazard. Walnut fragments present an allergenic risk, while wood splinters represent an extraneous physical material that can cause physical choking or internal injury.

128. (D) Clean-In-Place (CIP)
For enclosed, fixed pipeline systems, dismantling equipment for manual cleaning is impractical and highly inefficient. Clean-In-Place represents the modern standard for sanitizing these systems. It involves circulating water and specific cleaning and sanitizing solutions through the internal circuits at defined flow rates, times, and temperatures without dismantling the processing equipment.

129. (C) Statement I is true but Statement II is false
Biofilms are complex communities of microorganisms that adhere to surfaces and are protected by a self-produced polymeric matrix. They are highly resistant to standard sanitizers and simple water rinsing. Removing biofilms requires mechanical action combined with specialized chemical cleaning agents, making them a persistent contamination risk on food contact surfaces.

130. (C) Food-grade stainless steel
High-moisture food processing environments require materials that can withstand regular cleaning, water exposure, and sanitizers without degrading. Food-grade stainless steel is the standard material because it is smooth, non-porous, corrosion-resistant, and easy to sanitize. Brittle, porous, or toxic materials are prohibited to prevent physical, chemical, or biological contamination.

131. (A) Organic residue remains; re-clean and sanitize before use.
ATP bioluminescence swabbing measures organic residues containing adenosine triphosphate on surfaces. A high reading obtained immediately after sanitation indicates that organic soil or food residues remain on the machine, which can harbor pathogens. The equipment must be re-cleaned and sanitized before starting production to prevent biological cross-contamination.

132. (D) Floor drains should flow from low-risk areas to high-risk areas to conserve water.
Hygienic facility design must prevent potential cross-contamination. Floors should cove smoothly at walls, light fixtures must be shatterproof, and ventilation should manage condensation. Drainage systems must flow from high-risk processing zones (such as ready-to-eat packaging) to low-risk zones (such as raw material storage) to prevent the backflow of pathogens.

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133. (B) Isolate the batch, locate the machinery source, correct the issue, and scrap the package.
When an in-line metal detector rejects a package, the organization must implement established control procedures. The rejected product must be isolated to prevent consumer access. The food safety team must investigate the root cause, identify the machinery source of the physical contamination, correct the equipment issue, and dispose of the affected package.

134. (C) Ineffective microbial reduction, potentially leading to unsafe food.
Sanitizers require specific chemical concentrations to effectively disrupt microbial cells. Using a concentration significantly below the manufacturer's specification results in highly ineffective pathogen reduction. Microorganisms can survive on equipment surfaces, establishing biofilms that can contaminate subsequent product runs and potentially release unsafe food products to the market.

135. (D) Production scheduling - Running allergens first and non-allergens next without washing.
Allergen scheduling must prevent cross-contact. Running allergenic products first, followed immediately by non-allergenic products without executing a comprehensive wet cleaning and sanitization cycle, guarantees that protein residues will contaminate the subsequent non-allergen batches. Correct scheduling runs non-

allergens first, followed by allergens, or executes deep cleaning between production runs.

136. (A) I, II and IV
The Food Safety and Standards Act of 2006 consolidated older, fragmented food laws in India, establishing the FSSAI to regulate manufacturing, storage, distribution, and sale. This legislation successfully shifted the regulatory focus from merely preventing adulteration to establishing a science-based food safety management system, ensuring safe and wholesome food for human consumption.

137. (C) 2011
Although the Food Safety and Standards Act was enacted by the Parliament of India in 2006, its major administrative provisions, rules, and licensing regulations were not fully enforced until 2011. This specific enforcement year marked the formal transition from older regulatory acts to a unified national food safety licensing system managed by FSSAI.

138. (B) A food recall aims to remove unsafe food from the distribution chain and inform consumers.
Food recall procedures are designed to protect public health when a product is found to be unsafe. The primary goal is to systematically locate, withdraw, and remove unsafe food products from all active stages of the distribution chain. It also requires notifying consumers to prevent consumption of the affected product batches.

139. (C) A is true but R is false.
The Adjudicating Officer has the statutory authority to hold inquiries and impose monetary penalties for minor, non-criminal offenses, such as selling sub-standard or misbranded food. However, serious offenses that result in injury, severe illness, or death cannot be resolved by an Adjudicating Officer and must be prosecuted in standard judicial courts.

140. (C) Food that fails standards but is not unsafe.
Under the FSSA 2006, sub-standard food is defined as food that fails to meet specified quality standards but does not present an immediate threat to human health or cause safety concerns. Selling sub-standard food is an offense punishable by monetary fines, distinguishing it from unsafe food, which can cause illness or injury.

141. (D) Formulating and enacting new parliamentary acts on food safety laws.
The Designated Officer is an administrative and enforcement authority within a specific district. Their duties include issuing, suspending, or canceling operating licenses, receiving reports from food analysts, and sanctioning prosecutions. They do not possess legislative authority, as formulating and enacting national laws on food safety is the sole responsibility of the parliament.

142. (D) P-II, Q-III, R-I, S-IV
The FSSA 2006 establishes graded penalties based on the severity of the offense. Selling food not of the demanded quality carries a fine up to five lakh rupees. Sub-standard food carries a fine up to five lakh. Misbranded food carries a fine up to three lakh. Unsafe food causing death leads to heavy imprisonment and high fines.

143. (B) Initiate a food recall and notify authorities and consumers.
When a food business operator identifies that a distributed product is unsafe or contaminated, they must act immediately to protect public consumers. Legal compliance requires them to initiate a voluntary food recall to retrieve the product from the market, notify the appropriate food safety authorities, and inform consumers about the potential risks.

144. (A) Both Statement I and Statement II are true
Under enforcement protocols, if an inspector finds that a food business fails to meet safety requirements, the Designated Officer can issue a formal Improvement Notice. This notice details the non-compliance and specifies a timeframe for correction. If the operator fails to comply with this notice, the authority may suspend their operating license.

145. (A) To hear appeals from Adjudicating Officers.
The Food Safety Appellate Tribunal is established under the FSSA 2006 as a specialized judicial body. Its primary legal function is to hear and resolve appeals filed against the decisions and penalty orders issued by Adjudicating Officers, ensuring a fair, structured administrative justice process for all food business operators.

146. (C) Misbranded food
Under food safety regulations, if a product is packaged or labeled in a manner that deliberately mimics another popular brand, it is classified as

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misbranded. Even if the ingredients are safe to consume, the misleading appearance and labeling constitute an offense because they deceive consumers about the source, identity, or brand of the food.

147. (A) An FBO cannot be penalized if they prove the unsafe food was sold without their knowledge, even if they manufactured it.
Under the FSSA 2006, food business operators are held strictly liable for the safety of the foods they manufacture, distribute, or sell. An operator cannot escape liability or penalties by claiming they had no personal knowledge of the safety failure. This strict liability ensures that businesses maintain rigorous control over their production processes.

148. (D) Divide, seal, and dispatch the sample into four parts to the Food Analyst.
When enforcement officers suspect food adulteration and draw official samples, they must follow a strict legal sampling protocol. The Food Safety Officer is required to divide the collected sample into four distinct parts, seal each part securely in the presence of witnesses, and dispatch them to the accredited Food Analyst for analysis.

149. (B) License cancellation and prosecution for operating without a license.
If a food business operator continues to run their facility after their operating license has been suspended, they violate enforcement orders. This defiance directly leads to the cancellation of the license. Furthermore, the operator will face prosecution under the Act for illegally operating a food business without a valid license, which carries severe penalties.

150. (C) Commissioner of Food Safety - State authority enforcing food safety laws
The FSSA 2006 outlines specific roles for statutory authorities. The Commissioner of Food Safety is appointed at the state level and serves as the head authority responsible for the effective enforcement of food safety laws throughout the state. Other roles, like Food Safety Officers and Designated Officers, operate under their direct administrative jurisdiction.

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Statement II: The Commissioners of Food Safety of all States and Union Territories are ex-officio members of the CAC.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

28. Which of the following individuals/entities is NOT eligible to represent interests in the Central Advisory Committee?
(A) Agriculture sector representatives
(B) Foreign regulatory authorities
(C) Consumer organization representatives
(D) Food industry representatives

29. Identify the correct pair regarding the regulatory hierarchy at the state level under the Food Safety and Standards Act, 2006:
(A) Commissioner of Food Safety – Heads the food safety administration of the State
(B) Food Safety Officer – Issues state licenses to large manufacturers and oversees federal customs terminals
(C) Designated Officer – Appoints the Commissioner of Food Safety and acts as the state-level tribunal judge
(D) Food Analyst – Prosecutes FBOs in the High Court and coordinates physical police raids

30. The legal transition to the Food Safety and Standards Act, 2006 was largely an effect of which of the following causes?
(A) A mandatory global directive issued by the World Health Organization to unify all national food laws.
(B) The total absence of any statutory or administrative food safety law in India prior to the year 2006.
(C) Multiplicity of food laws and regulatory ministries creating confusion and hindering growth.
(D) A severe and widespread national famine that necessitated the establishment of strict rationing controls.

31. What is the minimum rank of an officer who can be appointed as a Designated Officer (DO) by the Commissioner of Food Safety under the Food Safety and Standards Act, 2006?
(A) District Magistrate
(B) Superintendent of Police
(C) Chief Medical Officer
(D) Sub-Divisional Officer

32. Which of the following is an incorrect statement regarding the validity of a license issued under the Food Safety and Standards (Licensing and Registration of Food Businesses) Regulations, 2011?
(A) A license can be issued for a period of 1 to 5 years at the request of the FBO.
(B) An application for renewal must be made not later than 30 days prior to the expiry date of the license.
(C) A license remains valid forever once issued, provided the FBO pays an annual fee.
(D) Any license for which a renewal application is filed late may incur a penalty fee.

33. Match the Licensing/Registration Forms (List I) with their respective purposes (List II) under the Food Safety and Standards Rules.
List I: (Licensing/Registration Forms)
P. Form A
Q. Form B
R. Form C
S. Form D
List II: (Purposes)
I. Application for License
II. Application for Registration
III. Format of License Document
IV. Annual Return format
(A) P-II, Q-I, R-III, S-IV
(B) P-I, Q-II, R-IV, S-III
(C) P-II, Q-I, R-IV, S-III
(D) P-III, Q-IV, R-I, S-II

34. Under the Food Safety and Standards Regulations, a "Petty Food Manufacturer" is defined as an FBO who:
(A) Exports diverse agricultural and processed food products to more than two developing foreign countries.
(B) Manufactures highly complex proprietary foods with a total annual turnover exceeding ₹50 lakhs.
(C) Operates a large-scale commercial abattoir processing more than 50 large ruminant animals per day.
(D) Manufactures or sells food himself with an annual turnover not exceeding ₹12 lakhs.

35. An FBO holding a valid State License decides to significantly alter the manufacturing premises,

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preparation is considered food.
(D) Yes, but only in instances where the groundwater has been modified with added sweeteners, minerals, or flavorings.

6. Analyze the Assertion (A) and Reason (R) given below, and choose the correct option.
Assertion (A): The Food Safety and Standards Act, 2006 resulted in the repeal of the Fruit Products Order, 1955 and the Meat Food Products Order, 1973.
Reason (R): The primary objective of the Food Safety and Standards Act, 2006 was to shift from a multi-level, multi-departmental control system to a single point of reference.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

7. Which of the following is a correct statement regarding the composition of the Food Authority (FSSAI) under the Food Safety and Standards Act, 2006?
(A) It consists of a Chairperson and 15 members, all appointed directly by the Prime Minister.
(B) It consists of a Chairperson and 22 members, out of which at least one-third shall be women.
(C) It consists of a Chairperson and 22 members, with no specific reservation for women.
(D) It consists of a Chief Executive Officer and 10 members representing the interests of various food industries.

8. While inspecting a processing plant, a Food Safety Officer notices a potential contamination risk. To whom does the Food Safety and Standards Act, 2006 assign the primary responsibility to ensure that food satisfies the requirements of the Act at all stages of production?
(A) The designated Food Safety Officer
(B) The local municipal corporation
(C) The Food Business Operator (FBO)
(D) The Food Safety and Standards Authority of India (FSSAI)

9. Consider the following statements regarding the statutory functions of the Food Safety and Standards Authority of India (FSSAI):
I. Specify procedures and guidelines for accreditation of certification bodies.
II. Provide scientific advice and technical support to the Central Government.
III. Directly arrest and prosecute consumers who waste food in commercial premises.
IV. Formulate standards for food additives and contaminants.
Which of the above statements are correct?
(A) I, II, and III
(B) II, III, and IV
(C) I, II, and IV
(D) I and IV only

10. In the context of the food safety legal framework, "Risk Management" is best described as:
(A) The process of weighing policy alternatives in consultation with stakeholders to select proper prevention and control options.
(B) The scientific evaluation of known or potential adverse health effects resulting from human exposure to food-borne hazards.
(C) The interactive exchange of scientific information and professional opinions concerning risks among various stakeholders.
(D) The mandatory corporate liability insurance policy that every commercial food business operator is required to possess.

11. According to Section 3 of the Food Safety and Standards Act, 2006, which of the following is NOT included in the definition of "Food"?
(A) Alcoholic beverages
(B) Animal feed
(C) Chewing gum
(D) Any substance used into the food during its manufacture

12. Arrange the following historical food safety legislations in India in chronological order of their enactment:
I. Meat Food Products Order
II. Prevention of Food Adulteration Act
III. Milk and Milk Products Order
IV. Food Safety and Standards Act
(A) II, I, III, IV
(B) I, II, III, IV
(C) II, III, I, IV
(D) III, II, I, IV

13. Identify the correct pair representing the statutory body and its primary focus under the Food Safety and Standards Act, 2006:
(A) Central Advisory Committee – Ensuring

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close cooperation between the Food Authority and enforcement agencies
(B) Scientific Panels – Resolving disputes between consumers and FBOs and recommending legal prosecution measures
(C) Food Safety Appellate Tribunal – Issuing food licenses to petty manufacturers and conducting periodic safety audits
(D) Scientific Committee – Adjudicating penalties for misbranded food and monitoring active food import terminals

14. Consider the following statements:
Statement I: The Chairperson of the Food Safety and Standards Authority of India (FSSAI) shall be a person of eminence in the field of food science or a person from the administration who has held the position of not below the rank of Secretary to the Government of India.
Statement II: The Chairperson is appointed by the State Government where the FSSAI headquarters is located.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

15. Match the repealed Orders (List I) with their erstwhile regulating ministries/departments prior to the Food Safety and Standards Act, 2006 (List II).
List I: (Repealed Orders)
P. Prevention of Food Adulteration Act
Q. Fruit Products Order
R. Meat Food Products Order
S. Milk and Milk Products Order
List II: (Regulating Ministries/Departments Prior to FSSA 2006)
I. Ministry of Food Processing Industries
II. Directorate of Marketing and Inspection / Ministry of Agriculture
III. Ministry of Health and Family Welfare
IV. Department of Animal Husbandry and Dairying
(A) P-III, Q-I, R-II, S-IV
(B) P-III, Q-II, R-I, S-IV
(C) P-I, Q-III, R-IV, S-II
(D) P-II, Q-I, R-III, S-IV

16. What is the most appropriate description of the role of the Scientific Committee under the Food Safety and Standards Authority of India (FSSAI)?
(A) To issue daily operational and procedural guidelines for Food Safety Officers conducting field inspections in districts.
(B) To act as the final administrative appellate authority for FBOs seeking to overturn licensing suspension orders.
(C) To provide scientific advice, coordinate Scientific Panels, and offer opinions on multi-disciplinary issues.
(D) To physically inspect food imports and evaluate phytosanitary certificates at all major national ports of entry.

17. Which of the following is an incorrect pair under the definitions of the Food Safety and Standards Act, 2006?
(A) Misbranded Food – Food offered with false claims on the label
(B) Extraneous Matter – Ingredients intentionally added to enhance the nutritional value of food
(C) Sub-standard Food – Food not meeting specified standards but not rendering it unsafe
(D) Unsafe Food – Food whose nature or quality is so affected as to render it injurious to health

18. Analyze the Assertion (A) and Reason (R) given below, and choose the correct option.
Assertion (A): The Food Authority is heavily reliant on the Scientific Panels and the Scientific Committee.
Reason (R): The Food Safety and Standards Act, 2006 mandates that food standards and regulations must be science-based and rely on independent scientific advice.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

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19. A major effect of the consolidation of multiple food laws into the single Food Safety and Standards Act, 2006 was:
(A) The establishment of a single reference point for all matters relating to food safety and standards.
(B) The increase in dual compliance requirements for food exporters.
(C) The elimination of science-based risk analysis

to speed up business.
(D) The transfer of food safety enforcement exclusively to the Central Government, removing State powers.

20. In which year were the Food Safety and Standards Rules, outlining the procedures for licensing, registration, and laboratory analysis, formally notified?
(A) 2006
(B) 2008
(C) 2011
(D) 2015

21. Consider the following entities:
I. A hawker selling freshly cut fruits on a cart.
II. A farmer selling whole raw agricultural wheat directly from the field.
III. A multi-national corporation producing fortified cereals.
IV. A pharmacy selling synthetic drugs.
Which of the above entities are subject to regulation under the definitions of the Food Safety and Standards Act, 2006?
(A) I, II, and III
(B) I and III only
(C) II, III, and IV
(D) III only

22. Under the Food Safety and Standards Act, 2006, an "Adulterant" is defined as:
(A) Any synthetic or artificial chemical coloring agent used intentionally to alter the appearance of processed foods.
(B) Only highly toxic chemical compounds that have been proven to cause acute mortality in laboratory animal trials.
(C) Any naturally occurring substance that significantly alters the original taste, texture, or aroma of a food product.
(D) Any material used for making food unsafe, sub-standard, mis-branded, or containing extraneous matter.

23. A small-scale food business operator has an annual turnover of ₹8 Lakhs. According to the Food Safety and Standards (Licensing and Registration of Food Businesses) Regulations, 2011, what is the regulatory requirement for this FBO?
(A) They must obtain a Central License directly from the national headquarters of FSSAI.
(B) They must obtain a Registration Certificate from the local authority.
(C) They must obtain a State License from the respective state food safety department.
(D) They are completely exempt from both registration and licensing.

24. Which of the following is a correct statement regarding the constitution of Scientific Panels under the Food Safety and Standards Authority of India (FSSAI)?
(A) Scientific Panels are composed exclusively of industry representatives to protect trade secrets.
(B) Scientific Panels can only be formed by an order of the Supreme Court of India.
(C) The Food Authority establishes Scientific Panels consisting of independent scientific experts.
(D) There is only one comprehensive Scientific Panel responsible for monitoring all food categories and chemical contaminants.

25. An FBO needs to track the path of a raw material from the supplier, through manufacturing, to the retail distributor. This legal requirement under the Food Safety and Standards Act, 2006 is termed:
(A) Food surveillance
(B) Risk communication
(C) Market recall
(D) Traceability

26. Which of the following is an incorrect statement regarding the Chief Executive Officer (CEO) of the Food Safety and Standards Authority of India (FSSAI)?
(A) The CEO holds final power to pass national legislations independently of Parliament.
(B) The CEO is appointed by the Central Government to lead the administrative functions of FSSAI.
(C) The CEO serves as the legal representative of the Food Authority in all judicial matters.
(D) The CEO is responsible for the day-to-day administration and management of the Food Authority.

27. Consider the following statements about the Central Advisory Committee (CAC):
Statement I: The CAC is constituted to ensure close cooperation between the Food Authority and the enforcement agencies operating in the field.

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liters of milk per day.

42. Arrange the procedural steps for the issuance of a food license in the correct sequence:
I. Pre-license inspection of premises by FSO
II. Submission of complete application with fee
III. Issue of license or rejection by Designated Officer
IV. Scrutiny of application and documents by licensing authority
(A) II, IV, I, III
(B) I, II, IV, III
(C) II, I, IV, III
(D) IV, II, I, III

43. Identify the correct pair representing the enforcement authority and its prescribed statutory role under the Food Safety and Standards Act, 2006:
(A) Commissioner of Food Safety – Conducting laboratory analysis of samples
(B) Designated Officer – Issuing or canceling food business licenses
(C) Food Analyst – Sanctioning prosecution for offenses punishable with imprisonment
(D) Food Safety Officer – Hearing appeals against the Adjudicating Officer

44. Consider the following statements regarding the suspension of a food license:
Statement I: A Designated Officer may suspend a license if the FBO fails to comply with an improvement notice.
Statement II: A suspended license cannot be revoked under any circumstances, and the FBO must permanently close the business.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

45. Match the FBO Category (List I) with the correct licensing/registration authority (List II).
List I: (FBO Category)
P. 100% Export Oriented Unit
Q. A tea stall vendor with ₹5 lakh turnover
R. A dairy processing 2,000 liters of milk/day
S. Proprietary food manufacturer selling nationwide
List II: (Licensing/Registration Authority)
I. State Licensing Authority
II. Central Licensing Authority
III. Registering Authority (Local)
IV. Central Licensing Authority
(A) P-II, Q-III, R-I, S-IV
(B) P-I, Q-III, R-II, S-IV
(C) P-IV, Q-I, R-III, S-II
(D) P-II, Q-I, R-IV, S-III

46. What is the Best Answer describing the primary role of a Food Safety Officer (FSO) during a routine inspection?
(A) To strictly punish non-compliant FBOs and collect administrative monetary fines directly on the spot.
(B) To train all manufacturing factory workers on how to operate heavy commercial machinery safely and efficiently.
(C) To inspect premises, draw samples, and ensure compliance with sanitary and hygienic requirements.
(D) To dictate pricing and marketing strategies for the finished food products manufactured at the plant.

47. Which of the following is an incorrect pair relating to the powers of a Food Safety Officer under the Food Safety and Standards Act, 2006?
(A) Section 38 – Powers of Food Safety Officer
(B) Seizure of adulterated food – FSO is authorized
(C) Destruction of highly perishable unsafe food – FSO is authorized
(D) Section 37 – Powers of Food Analyst

48. Analyze the Assertion (A) and Reason (R) given below, and choose the correct option.
Assertion (A): The Food Safety Officer has the power to seize any article of food which appears to be in contravention of the Food Safety and Standards Act, 2006.
Reason (R): The primary objective of the FSO's seizure power is to prevent unsafe or non-compliant food from reaching the consumers.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

49. What is the legal effect of an FBO obstructing or impersonating a Food Safety Officer in the discharge of their duties under the Food Safety and Standards Act, 2006?
(A) The FBO is issued a mild verbal warning

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modifying the layout to add a new production line. What is the legal requirement under the Food Safety and Standards rules?
(A) The FBO must apply for a modification of the license before initiating production in the new line.
(B) The FBO can proceed to make structural changes without notifying any regulator as long as the license is valid.
(C) The FBO must completely surrender the current license and wait for the issuance of a new Central License.
(D) The FBO only needs to inform the local police station and municipal corporation in writing.

36. Analyze the Assertion (A) and Reason (R) given below, and choose the correct option.
Assertion (A): Large-scale food manufacturing units and 100% Export Oriented Units (EOUs) are required to obtain a Central License rather than a State License.
Reason (R): Central licensing manages high-capacity producers, widespread operations, and complex cross-border trade to ensure uniform national standards.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

37. Which of the following is a correct statement regarding the registration of petty food businesses?
(A) The registering authority must issue the certificate within 7 days or reject it with written reasons.
(B) Petty FBOs are required to submit extensive laboratory analysis reports of all ingredients to get registered.
(C) The registration certificate does not need to be displayed at a prominent place in the premises.
(D) Petty FBOs are automatically and unconditionally elevated to full state-licensed status after exactly one year of registration.

38. If a Food Safety Officer reports that an FBO has failed to comply with an improvement notice, what is the most appropriate action for the Designated Officer to take?
(A) Immediately sentence the FBO to six months of rigorous imprisonment and seal their residential premises.
(B) Confiscate all personal property, bank accounts, and real estate assets belonging directly to the FBO.
(C) Transfer the FBO's active operating license to a direct market competitor within the same district.
(D) Cancel or suspend the license of the FBO after giving an opportunity to show cause.

39. Consider the following conditions of a license under the Food Safety and Standards Authority of India (FSSAI) regulations:
I. Maintain factory records regarding production and raw materials.
II. Ensure that source and standards of raw material are of optimum quality.
III. Employ at least one technical person to supervise the production process.
IV. Provide free meals to inspecting Food Safety Officers.
Which of the above statements represent valid conditions of an FSSAI license?
(A) I, II, and IV
(B) I, II, and III
(C) II, III, and IV
(D) I and III only

40. An FBO implements a comprehensive plan to control food safety hazards, including prerequisite programs and HACCP principles. This regulatory requirement under the Food Safety and Standards Act, 2006 is commonly referred to as:
(A) Good Corporate Governance (GCG) principles
(B) Advanced Quality Control (AQC) standards
(C) Food Safety Management System (FSMS)
(D) Total Productive Maintenance (TPM) framework

41. Which of the following is NOT exempt from the requirement of obtaining a license or registration under the Food Safety and Standards Act, 2006?
(A) A person purchasing food solely for their family's domestic consumption.
(B) A farmer manufacturing jaggery on their farm using traditional methods for local sale.
(C) A registered medical practitioner dispensing synthetic vitamins and health supplements.
(D) A cooperative society processing 10,000

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CHAPTER 27

Food Safety and Standards Act 2006, Food Safety and Standards Rules 2011 and Legal Framework

1. Which of the following legislations was the primary food safety law in India before the enactment of the Food Safety and Standards Act, 2006?
(A) The Essential Commodities Act, 1955
(B) The Prevention of Food Adulteration Act, 1954
(C) The Food Corporation Act, 1964
(D) The Standards of Weights and Measures Act, 1976

2. Which of the following is an incorrect statement regarding the objectives of the Food Safety and Standards Act, 2006?
(A) To consolidate multiple existing laws and regulations relating to food safety into a single statute.
(B) To establish the Food Safety and Standards Authority of India for effective regulatory control.
(C) To lay down science-based standards for the manufacturing, storage, and distribution of food.
(D) To regulate the market pricing and inter-state distribution of raw agricultural commodities.

3. Match the terms defined under the Food Safety and Standards Act, 2006 (List I) with their correct descriptions (List II).
List I: (Terms Defined under FSSA 2006)
P. Food Business
Q. Adulterant
R. Contaminant
S. Hazard
List II: (Descriptions)
I. Any substance that makes food unsafe or sub-standard
II. Biological, chemical, or physical agent with potential to cause adverse health effects
III. Any undertaking carrying out activities related to food manufacture, processing, or distribution
IV. Any substance not intentionally added to food, present as a result of production or environmental context
(A) P-III, Q-I, R-IV, S-II
(B) P-I, Q-III, R-II, S-IV
(C) P-III, Q-IV, R-I, S-II
(D) P-IV, Q-I, R-III, S-II

4. Under the Food Safety and Standards Act, 2006, "Food Safety" is legally defined as:
(A) Assurance that the food remains completely free from all microbial pathogens, chemical residues, and additives.
(B) Guarantee that a packaged food item retains its full nutritional value and organoleptic properties for a year.
(C) Assurance that food will not cause harm to the consumer when prepared and eaten according to its intended use.
(D) Official certification by an authorized public laboratory verifying that the food is safe for mass market consumption.

5. A Food Business Operator (FBO) packages and sells raw, untreated borewell water labeled as "Natural Mineral Water" without complying with specific standard parameters. Under the Food Safety and Standards Act, 2006, does this product fall under the purview of "Food"?
(A) Yes, as packaged drinking water and natural mineral water are explicitly included in the statutory definition.
(B) No, as raw groundwater resources are exclusively regulated under the jurisdiction of the Ministry of Jal Shakti.
(C) No, as only potable water utilized as an active ingredient during commercial food

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by the local municipal authority without any financial penalty.
(B) The FBO commits a punishable offense liable to imprisonment and a fine.
(C) The FSO must resign from their position.
(D) The FBO's registered annual turnover limit is automatically and permanently reduced by exactly half.

50. Under the Food Safety and Standards Act, 2006, within how many days is the licensing authority required to issue a license or reject the application, provided the application is complete in all respects?
(A) 15 days
(B) 30 days
(C) 60 days
(D) 90 days

51. Consider the following duties of a Food Safety Officer (FSO):
I. Inspecting all food establishments licensed for manufacturing.
II. Drawing samples for analysis.
III. Maintaining a database of all food businesses within their jurisdiction.
IV. Approving the scientific standards for novel foods.
Which of the above are correct duties of an FSO?
(A) I, II, and III
(B) I, III, and IV
(C) II, III, and IV
(D) I and II only

52. In the context of Food Safety and Standards Act, 2006 enforcement, a "Designated Officer" is defined as:
(A) An officer appointed directly by the national FSSAI Chief Executive Officer to oversee international trade imports.
(B) An officer of the local municipal police department who is charged with physically assisting the FSO during raids.
(C) An officer appointed by the Commissioner of Food Safety to manage administration in a specified area.
(D) An independent third-party auditor hired privately by an FBO to conduct annual internal food safety reviews.

53. An FSO inspects a wholesale godown and finds insects and visible mold in large sacks of wheat flour. Applying the statutory powers under the Food Safety and Standards Act, 2006, what immediate action can the FSO take?
(A) Seize the adulterated wheat flour, issue a receipt, and keep it in safe custody.
(B) Confiscate the entire commercial building and immediately arrest the owner of the godown without any warrant.
(C) Ignore the finding entirely as raw agricultural commodities are completely exempt from FSSA jurisdiction.
(D) Order the food business operator to wash the affected flour thoroughly and repackage it for sale.

54. Which of the following is a correct statement regarding the sampling procedure by a Food Safety Officer?
(A) The FSO is not required to issue any statutory notice in writing to the FBO prior to initiating sample collection.
(B) The FSO can legally collect food samples only during sudden midnight inspections to catch potential violators off-guard.
(C) The FSO must personally transport the collected food sample to the laboratory without employing authorized courier services.
(D) The FSO must pay the cost of the sample to the person from whom it is taken at the prevailing market rate.

55. The legal and scientific requirement to maintain the integrity of a food sample from the point of collection until its analysis in the laboratory, ensuring it is tamper-proof, under the Food Safety and Standards Act, 2006, is termed:
(A) Chain of Command
(B) Chain of Custody
(C) Standard Operating Traceability
(D) Quality Assurance Protocol

56. Which of the following is an incorrect statement regarding the Designated Officer (DO)?
(A) The DO has the authority to issue or cancel food licenses.
(B) The DO is responsible for sanctioning prosecution in cases punishable with imprisonment up to 3 years.
(C) The DO personally conducts chemical analysis of food samples in the state laboratory.
(D) The DO investigates complaints made against Food Safety Officers.

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(A) The Tribunal hears appeals against the decisions of the Adjudicating Officer.
(B) The Presiding Officer of the Tribunal is appointed by the Central or State Government.
(C) The Presiding Officer must be or have been a District Judge.
(D) The Tribunal is the first responder that collects food samples from factories.

87. Consider the following statements:
Statement I: Offenses like manufacturing unsafe food are prosecuted in regular courts (Judicial Magistrate/Special Courts) rather than by the Adjudicating Officer.
Statement II: The Adjudicating Officer only handles offenses punishable with monetary penalties (civil nature).
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

88. Which of the following cases is an exception that is NOT handled by the Adjudicating Officer?
(A) Sale of sub-standard food that does not cause direct bodily injury to consumers.
(B) Sale of packaged food products containing small amounts of non-toxic extraneous matter.
(C) Manufacturing unsafe food causing grievous injury.
(D) Operating an unhygienic or unsanitary manufacturing facility for processing common food.

89. Identify the correct pair mapping the offense to the corresponding penalty section under the Food Safety and Standards Act, 2006:
(A) Section 50 – Penalty for selling food not of the nature or substance or quality demanded
(B) Section 51 – Penalty for misbranded food resulting in deceptive packaging and labeling.
(C) Section 52 – Penalty for sub-standard food which fails to meet active statutory parameters.
(D) Section 53 – Penalty for unsafe food causing death

90. The strict regulatory enforcement against misbranding is a direct cause yielding which of the following effects?
(A) Prevention of misleading health claims and protection of the consumer's right to accurate information.
(B) An artificial increase in the overall level of daily deception and fraud experienced by general retail consumers.
(C) A gradual and unintended decrease in the biological quality of raw agricultural produce harvested from farms.
(D) The implementation of a mandatory and uniform standardization of all food retail prices across the nation.

91. What primary document is issued by the Authorized Officer to customs authorities indicating that an imported food consignment complies with the Food Safety and Standards Authority of India (FSSAI) standards and can be released?
(A) Bill of Lading document
(B) Non-Objection Certificate (NOC)
(C) Letter of Credit facility
(D) Signed Commercial Invoice from exporter

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92. Which of the following is an incorrect statement regarding import regulations under the Food Safety and Standards Act, 2006?
(A) No person can import any food article that is unsafe or misbranded.
(B) All imported foods are exempt from FSSAI packaging and labelling regulations.
(C) Food imported into India must have a minimum of 60% of its shelf life remaining at the time of customs clearance.
(D) The Authorized Officer may draw samples of the imported food for testing.

93. Match the FSSAI IT systems/terms (List I) with their functions related to food imports (List II).
List I: (FSSAI IT Systems/Terms)
P. FICS
Q. SWIFT
R. NOC
S. NCC
List II: (Functions)
I. Food Import Clearance System
II. Single Window Interface for Facilitating Trade (Customs)
III. No Objection Certificate
IV. Non-Conformance Certificate
(A) P-I, Q-II, R-III, S-IV
(B) P-II, Q-I, R-IV, S-III
(C) P-I, Q-III, R-II, S-IV
(D) P-III, Q-IV, R-I, S-II

(D) An independent third-party auditor hired directly by the FBO to conduct periodic internal quality control checks.

65. A primary analysis by the Food Analyst declares a milk sample as sub-standard. The FBO strongly disputes this finding. What legal recourse is available to the FBO under the Food Safety and Standards Act, 2006?
(A) The FBO can immediately destroy the entire remaining batch of food products and completely ignore the analyst's report.
(B) The FBO can appeal to the Designated Officer to send a retained part to a Referral Laboratory.
(C) The FBO can issue a formal public notice in national newspapers declaring the Food Analyst's report to be null and void.
(D) The FBO must directly approach the Hon'ble Supreme Court of India to obtain an immediate stay order on any prosecution.

66. Analyze the Assertion (A) and Reason (R) given below, and choose the correct option.
Assertion (A): The certificate issued by the Director of the Referral Food Laboratory supersedes the report given by the primary Food Analyst.
Reason (R): The Referral Laboratory acts as the supreme appellate authority in matters of analytical disputes to ensure technical accuracy and fairness.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

67. Which of the following is a correct statement regarding accredited laboratories under the Food Safety and Standards Authority of India (FSSAI)?
(A) The Food Authority may recognize any laboratory accredited by the National Accreditation Board (NABL).
(B) The Food Authority recognizes only public government-owned testing laboratories operating at the state level.
(C) FSSAI does not require laboratories to be formally accredited as long as they possess advanced analytical equipment.
(D) Only government laboratories situated in the capital of New Delhi are legally authorized to test food import samples.

68. When an FSO lifts a sample of loose edible oil from a retail shop, what specific competency must the FSO demonstrate to ensure legal validity?
(A) Adding arbitrary, unmeasured amounts of formaldehyde solution to ensure that the edible oil sample does not spoil.
(B) Collecting the oil directly in the shopkeeper's unwashed container to demonstrate existing biological contamination.
(C) Using a clean, dry container and sealing it properly to prevent leakage and tampering.
(D) Tasting the edible oil prior to sampling to personally confirm its raw authenticity and quality parameters.

69. Consider the following functions:
I. Analysis of samples sent by the Designated Officer for appeal.
II. Investigation for fixing standards of food articles.
III. Issuing food manufacturing licenses to multi-national corporations.
IV. Organizing training programs for Food Analysts.
Which of the above are the functions of a Referral Food Laboratory?
(A) I, II, and III
(B) I, II, and IV
(C) II, III, and IV
(D) I and IV only

70. The systematic procedure ensuring that a food sample is securely handled, transported, and stored with documented tracking from collection to analysis is an application of:
(A) HACCP
(B) Good Manufacturing Practices (GMP)
(C) Food Fortification
(D) Chain of Custody

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71. Which of the following is NOT a prescribed duty of a Food Analyst under the Food Safety and Standards Act, 2006?
(A) Receiving and analyzing samples of food sent by the FSO.
(B) Sanctioning prosecution against the FBO based on the analysis report.
(C) Forwarding the analysis report to the Designated Officer within 14 days.

(D) Declaring the method of analysis used in the report.

72. Arrange the food sampling and analysis workflow in the correct sequence:
I. FSO divides sample into four parts and seals them.
II. Food Analyst conducts analysis and sends report to DO.
III. FSO serves notice of intention to sample to FBO.
IV. DO reviews report and decides on prosecution/adjudication.
(A) III, I, II, IV
(B) I, III, II, IV
(C) III, II, I, IV
(D) I, II, III, IV

73. Identify the correct pair regarding the maximum time limit for a Food Analyst to send the analysis report to the Designated Officer under normal circumstances under the Food Safety and Standards Act, 2006:
(A) 7 days
(B) 14 days
(C) 30 days
(D) 60 days

74. Consider the following statements:
Statement I: If a Food Analyst cannot complete the analysis within 14 days, they must inform the Designated Officer of the delay and specify the time required.
Statement II: A delay in analysis automatically acquits the FBO of any potential charges.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

75. Match the nature of the non-compliance (List I) with the adjudicating/prosecuting authority (List II) as per the Food Safety and Standards Act, 2006.
List I: (Nature of Non-Compliance)
P. Sub-standard food (no injury)
Q. Misbranded food
R. Unsafe food causing grievous injury
S. Failure to comply with FSO directions
List II: (Adjudicating/Prosecuting Authority)
I. Adjudicating Officer
II. Judicial Magistrate First Class / Special Court
III. Adjudicating Officer
IV. Adjudicating Officer
(A) P-I, Q-III, R-II, S-IV
(B) P-II, Q-I, R-III, S-IV
(C) P-I, Q-II, R-III, S-IV
(D) P-III, Q-IV, R-I, S-II

76. What is the Best Answer explaining why a food sample is divided into four parts?
(A) To allow the inspecting FSO to keep one part for personal sensory analysis and another part for local municipal record keeping.
(B) To have one part for primary analysis, two for the DO's safekeeping, and one for the FBO's independent testing.
(C) To systematically divide the financial cost of scientific chemical testing among four different public reference laboratories.
(D) To ensure that four completely different analytical methods of testing are conducted simultaneously to verify overall accuracy.

77. Which of the following is an incorrect statement regarding the sealing of samples?
(A) FBO refusal to sign – Renders the sample legally invalid and immune to testing
(B) FSO signature – Required on the sample wrapper at the time of sealing to verify authority.
(C) FBO signature or thumb impression – Required on the sample wrapper to establish presence.
(D) Paper slip with DO signature – Pasted securely over the seal to prevent unauthorized opening.

78. Analyze the Assertion (A) and Reason (R) given below, and choose the correct option.
Assertion (A): The Food Safety and Standards Act, 2006 differentiates between offenses punishable by monetary penalty and those punishable by imprisonment.
Reason (R): The Act seeks to decriminalize minor technical offenses like misbranding while retaining strict criminal liability for manufacturing unsafe food.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

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79. What is a direct legal effect of selling food that is of sub-standard quality but does not render the food unsafe?
(A) Immediate and unconditional life imprisonment for the FBO and all manufacturing facility managers.
(B) Sudden and complete suspension of all regulatory FSSAI administrative operations across the entire state.
(C) Mandatory publishing of a formal public apology in at least three prominent national daily newspapers.
(D) Liability to a civil penalty up to ₹5 Lakhs decided by the Adjudicating Officer.

80. According to the Food Safety and Standards Act (FSSA), 2006 penalty structure, what is the maximum penalty for manufacturing or selling misbranded food?
(A) Up to ₹1 Lakh
(B) Up to ₹3 Lakhs
(C) Up to ₹5 Lakhs
(D) Up to ₹10 Lakhs

81. Consider the following criteria used by the Adjudicating Officer to determine the quantum of penalty under the Food Safety and Standards Act, 2006:
I. The amount of disproportionate gain or unfair advantage, wherever quantifiable.
II. The amount of loss caused to any person as a result of the default.
III. The repetitive nature of the default.
IV. The political affiliation of the FBO.
Which of the above are legally mandated criteria under the Act?
(A) I, II, and III
(B) I and II only
(C) II, III, and IV
(D) I, III, and IV

82. Under the Food Safety and Standards Act, 2006, a food article is defined as "Misbranded" if:
(A) It contains any quantity of legally permitted synthetic food coloring agents that are declared on the package.
(B) It is specifically formulated to contain significantly lower sugar or caloric content than the reference standard.
(C) It is distributed and sold after being successfully imported into India through an authorized customs channel.
(D) It is sold with false, misleading, or deceptive claims printed on the package label.

83. An FBO is found guilty of manufacturing an adulterated food article that caused the death of a consumer. Under Section 59 of the Food Safety and Standards Act, 2006, what is the prescribed punishment?
(A) Imprisonment of not less than 7 years which may extend to life, and a fine not less than ₹10 Lakhs.
(B) Imprisonment for a brief period of 6 months and a maximum administrative fine of ₹1 Lakh.
(C) A simple formal written warning accompanied by the temporary cancellation of the FBO's active food license.
(D) Mandatory community service under local municipal supervision for a duration of exactly one year.

84. Which of the following is a correct statement regarding the Adjudicating Officer under the Food Safety and Standards Act, 2006?
(A) The Adjudicating Officer actively conducts criminal trials for severe food offenses carrying maximum sentences of life imprisonment.
(B) The Adjudicating Officer is appointed directly by the Prime Minister of India upon recommendation from the Union Cabinet.
(C) The Adjudicating Officer must be an officer not below the rank of Additional District Magistrate (ADM).
(D) The Adjudicating Officer is a senior FSSAI research scientist specialized in analytical food chemistry and toxicological evaluation.

85. A manufacturer includes misleading claims on a health supplement label stating it "cures cancer". Applying concepts from the Food Safety and Standards Act, 2006, the resulting regulatory action focuses primarily on:
(A) Penalizing for misbranding and false advertisement.
(B) Compensating rival health supplement companies for lost market share.
(C) Initiating tax evasion prosecution through the income tax department.
(D) Revoking the citizenship and passport of the company's manufacturer.

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86. Which of the following is an incorrect statement regarding the Food Safety Appellate Tribunal?

57. Consider the following statements:
Statement I: When a Food Safety Officer takes a sample of food for analysis, they must serve a notice in writing to the FBO stating their intention to have it analyzed.
Statement II: The sample collected must be divided into three parts only.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

58. Which of the following actions is a Food Safety Officer explicitly NOT authorized to do under Section 38 of the Food Safety and Standards Act, 2006?
(A) Levy and collect monetary penalties directly in cash from the FBO at the time of inspection.
(B) Enter and inspect any place where food is manufactured or stored.
(C) Seize any article of food appearing to be unsafe.
(D) Break open any package in which any article of food may be contained, if the owner refuses to open it.

59. Identify the correct pair mapping the statutory role to the relevant section of the Food Safety and Standards Act, 2006:
(A) Section 36 – Duties of Commissioner of Food Safety
(B) Section 43 – Recognition and accreditation of laboratories
(C) Section 37 – Appointment of Food Safety Officer and their administrative powers
(D) Section 30 – Liability of manufacturers

60. What is the legal effect of adding an approved preservative to a food sample collected for analysis by the FSO under the Food Safety and Standards Act, 2006?
(A) It immediately renders the collected sample completely invalid for any subsequent legal court proceedings.
(B) It prevents natural decomposition of the sample during transit and storage prior to chemical analysis.
(C) It artificially alters standard chemical parameters in order to favor the FBO during scientific evaluation.
(D) It constitutes a serious criminal offense that is heavily punishable by law under standard FSSA provisions.

61. Into how many parts is a food sample typically divided by the Food Safety Officer under the standard Food Safety and Standards Rules for analysis and reference?
(A) 2
(B) 3
(C) 4
(D) 5

62. Which of the following is an incorrect statement regarding the dispatch of sample parts by the Food Safety Officer?
(A) One part is sent to the Food Analyst under intimation to the Designated Officer.
(B) Two parts are sent to the Designated Officer for keeping in safe custody.
(C) The fourth part is analyzed by the FSO on the spot using a portable kit.
(D) The fourth part is sent to an accredited laboratory if requested by the FBO.

63. Match the destination of the divided food sample parts (List I) with their respective purpose (List II) as per the Food Safety and Standards Rules.
List I: (Divided Food Sample Parts)
P. Part 1
Q. Parts 2 & 3
R. Part 4
List II: (Purposes)
I. Sent to the Designated Officer for safe custody (for referral laboratory or appeal).
II. Sent to the Food Analyst for primary analysis.
III. Sent for analysis to a NABL accredited laboratory if requested by the FBO.
(A) P-II, Q-I, R-III
(B) P-I, Q-II, R-III
(C) P-III, Q-I, R-II
(D) P-II, Q-III, R-I

64. Under the Food Safety and Standards Act, 2006, a "Food Analyst" is formally defined as:
(A) Any technical graduate holding a basic chemistry degree who is currently working in an unaccredited private firm.
(B) An appointed FSSAI board member who is primarily responsible for drafting scientific national standards.
(C) A person appointed by the Commissioner of Food Safety to analyze samples for a specified local area.

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94. Under the Food Safety and Standards (Import) Regulations, an "Authorized Officer" is defined as:
(A) A foreign diplomat or trade representative representing the interests of the exporting nation.
(B) The registered captain or master of the commercial cargo ship transporting the food consignment.
(C) An officer appointed by the FSSAI CEO to perform import clearance functions.
(D) The managing director or chief executive officer representing the interests of the importing FBO.

95. An importer attempts to clear a consignment of packaged cheese with a total shelf life of 12 months. At the time of import clearance at the Indian port, 8 months have already passed since the date of manufacture. Applying the Food Safety and Standards Authority of India (FSSAI) import rules, what will be the outcome?
(A) The consignment will be cleared normally by customs because specific cheese products improve in quality with age.
(B) The consignment will be cleared for commercial sale but immediately slapped with a hefty 50% import tariff penalty.
(C) The consignment will be fully repackaged with a fresh date of manufacture under direct supervision of customs officers.
(D) The consignment is rejected for failing to meet the mandatory 60% remaining shelf life.

96. Analyze the Assertion (A) and Reason (R) given below, and choose the correct option.
Assertion (A): FSSAI applies a risk-based inspection system for food imports.
Reason (R): It allows for targeted sampling of high-risk food items while facilitating faster clearance for low-risk foods with established compliance histories.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

97. Which of the following is a correct statement regarding the clearance of imported food?
(A) If a sample fails the mandatory laboratory test, the importer can still sell it in the domestic market at a heavy discount.
(B) Upon non-conformance, the Authorized Officer issues an NCR and the food is denied entry into India.
(C) Registered commercial importers can bypass FSSAI clearance completely if they currently hold a valid ISO 9001 certificate.
(D) A standard visual inspection conducted by customs officers is legally sufficient to clear all categories of high-risk food.

98. A food importer receives a Non-Conformance Certificate for a consignment of contaminated spices. What competency must the Authorized Officer demonstrate in handling this rejected imported food under the concepts of the Food Safety and Standards Act, 2006?
(A) Processing the rejected spices immediately into low-grade commercial animal feed without conducting further chemical tests.
(B) Disinfecting the spices using chemical fumigation processes and subsequently releasing them for sale to local markets.
(C) Distributing the contaminated spices for free to various local charitable organizations and non-profit food shelters.
(D) Ordering the consignment to be destroyed or deported back to the exporting nation under supervision.

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99. Consider the following requirements for a novel food under the Food Safety and Standards regulations:
I. Prior product approval must be obtained from FSSAI.
II. Safety data and risk assessment studies must be submitted.
III. It must be proven to be cheaper than existing alternatives.
IV. It must not have a history of human consumption in India.
Which of the above statements are correct?
(A) I, II, and IV
(B) I, II, and III
(C) II, III, and IV
(D) I and IV only

100. The regulatory principle wherein an exporting country's food safety standards are accepted by India because they achieve the same level of protection, despite differing procedures, is known as:

114. Which of the following is a correct statement regarding the declaration of vegetarian and non-vegetarian food on a package?
(A) A green circle inside a square indicates non-vegetarian food.
(B) A blue circle indicates organic food certified by the Ministry of Commerce.
(C) Vegetarian symbols are optional for imported foods.
(D) A brown triangle inside a square indicates non-vegetarian food.

115. A manufacturer calculates the energy value of a food product by summing the calories derived from carbohydrates, proteins, and fats. This concept applied for mandatory labelling under the Food Safety and Standards Authority of India (FSSAI) is termed:
(A) Nutritional Profiling / Information
(B) Isotope dilution analysis
(C) Shelf-life estimation methods
(D) Biological value and safety assessment trials

116. Which of the following is an incorrect statement regarding the special labelling requirements for infant milk substitutes and infant foods?
(A) The label must bear a prominent statement: "MOTHER'S MILK IS BEST FOR YOUR BABY".
(B) The label must not contain pictures of infants or women to idealize the use of the product.
(C) The label can legally claim that the formula is medically superior to breast milk.
(D) The product must strictly adhere to the standards of the Infant Milk Substitutes Act.

117. Consider the following statements regarding health supplements and nutraceuticals under the Food Safety and Standards Act, 2006:
Statement I: Health supplements cannot claim to prevent, treat, or cure any human disease unless specifically permitted.
Statement II: They must carry a warning reading "Not for medicinal use".
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

118. Which of the following foods is generally treated as a negative exception (exempt) from bearing a mandatory nutritional information panel on the label?
(A) Packaged sugar-sweetened and pasteurized fruit juice ready for retail sale.
(B) Pasteurized and fortified milk enriched with vitamins A and D.
(C) Instant dehydrated wheat noodles with seasoning taste-maker.
(D) Single-ingredient raw agricultural commodities like whole wheat grains

119. Identify the correct pair regarding the elements on a food label:
(A) Best Before Date – The date after which the food product becomes immediately highly toxic to human health.
(B) Expiry / Use By Date – The date after which food must not be sold or consumed due to safety hazards.
(C) FSSAI Logo – Optional for licensed food manufacturers who have a turnover under ten crores.
(D) Lot / Batch Number – A regulatory tracking code that is exclusively required for exported food goods.

120. A brand of juice advertises on its label that it "burns body fat instantly". What is the regulatory effect of this unapproved health claim under the Food Safety and Standards Authority of India (FSSAI) regulations?
(A) The product is officially classified and regulated as an Ayurvedic clinical drug.
(B) The product automatically receives a special fast-track patent from the government.
(C) The product is deemed "Misbranded", making the FBO liable for penalties.
(D) The manufacturing FBO is completely exempt from paying standard central GST.

121. Under the Food Safety and Standards (Food Recall Procedure) Regulations, how is a recall classified where the consumption of the food is highly likely to cause serious adverse health consequences or death?
(A) Class I
(B) Class II
(C) Class III
(D) Class IV

122. Which of the following is an incorrect statement regarding the food recall process?
(A) Recall procedures are solely the responsibility

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107. Which of the following is an incorrect pair regarding heavy metal contaminants under the Food Safety and Standards Authority of India (FSSAI) standards?
(A) Lead – Can cause neurological damage; strictly regulated
(B) Calcium – Highly restricted toxic heavy metal in milk
(C) Mercury – Commonly monitored in fish and seafood
(D) Arsenic – Monitored in rice and drinking water

108. Analyze the Assertion (A) and Reason (R) given below, and choose the correct option.
Assertion (A): Proprietary foods are not allowed to contain any artificial food additives.
Reason (R): Proprietary foods do not have specific standards laid down in the Food Safety and Standards regulations, so they must be entirely natural.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

109. What is the direct legal effect if a manufacturer uses a food additive that is not approved under the Food Safety and Standards (Food Products Standards and Food Additives) Regulations?
(A) The product is deemed unsafe or sub-standard, leading to product rejection and penal action.
(B) The product is officially classified and marketed as a premium certified organic food.
(C) The product must be sold at a fixed higher retail price to offset chemical additive testing costs.
(D) The FBO automatically receives a special government subsidy for implementing food technology innovation.

110. In the Food Safety and Standards Authority of India (FSSAI) labelling regulations, the part of the package label that is most likely to be displayed, presented, or examined under customary conditions of display for retail sale is called the:
(A) Nutritional Display Panel
(B) Ingredients List Panel
(C) Principal Display Panel
(D) Warning Display Panel

111. Consider the following labelling requirements for pre-packaged foods under the Food Safety and Standards regulations:
I. Name of the food
II. List of ingredients in descending order of weight or volume
III. Nutritional information per 100g/100ml or per serving
IV. The exact profit margin of the manufacturer
Which of the above are mandatory requirements?
(A) I, II, and III
(B) I, III, and IV
(C) II, III, and IV
(D) I and II only

112. According to the Food Safety and Standards regulations, "Proprietary Food" is legally defined as:
(A) Food that has been traditionally and historically consumed by local communities within the territory of India.
(B) Food that is officially patented and sold exclusively through registered pharmacies and clinical channels.
(C) Food for which standards are not specified but is made using permitted ingredients and additives.
(D) Food that is scientifically proven to be completely and permanently devoid of any micro or macronutrient value.

113. A baker produces packaged cookies containing peanuts. Under the Food Safety and Standards Authority of India (FSSAI) packaging and labelling rules, how should this be handled?
(A) The peanut ingredients must be ground into an ultra-fine paste so that they remain physically invisible.
(B) A prominent allergen warning must be printed on the label declaring the presence of peanuts.
(C) Peanuts and other common tree nuts are completely banned in all categories of commercial proprietary foods.
(D) The bakery operator only needs to inform regular retail customers verbally about potential peanut content.

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(A) Harmonization
(B) Standardization
(C) Equivalence
(D) Reciprocity

101. Which of the following is an exception to the general import clearance procedures, meaning it does NOT typically require a routine Food Safety and Standards Authority of India (FSSAI) No Objection Certificate (NOC)?
(A) Food imported as a sample for exhibition or research purposes, not for human consumption.
(B) Standard pre-packaged food imported in bulk quantities intended directly for commercial retail sale.
(C) Large bulk cargo shipments of crude edible seed oil meant for refinery and local distribution.
(D) Branded cocoa and chocolate products imported in retail packages for commercial wholesale distribution.

102. Arrange the import clearance steps in the correct chronological order:
I. Filing of Integrated Declaration in ICEGATE/SWIFT.
II. Document scrutiny and visual inspection by Authorized Officer.
III. Drawing of sample and sending to lab.
IV. Issue of NOC or NCC based on lab report.
(A) I, II, III, IV
(B) II, I, III, IV
(C) I, III, II, IV
(D) IV, I, II, III

103. Identify the correct pair regarding food additives and standards under the Food Safety and Standards Regulations:
(A) GMP (Good Manufacturing Practice) quantum – Unlimited usage without any restriction on safety
(B) Maximum Permitted Level (MPL) – The highest legally acceptable concentration of an additive in a food category
(C) ADI (Acceptable Daily Intake) – The minimum amount of an additive required to achieve technological function
(D) Processing Aid – An additive that remains heavily present and functional in the final food product offered to the consumer.

104. Consider the following statements about product approval under the Food Safety and Standards regulations:
Statement I: Non-specified food and food ingredients, including novel foods, require prior approval from FSSAI before they can be manufactured or imported.
Statement II: Standardized foods conforming to the FSS (Food Products Standards and Food Additives) Regulations also require individual product approval before launch.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

105. Match the Functional Class of Food Additives (List I) with their purpose (List II).
List I: (Functional Class of Food Additives)
P. Emulsifier
Q. Preservative
R. Antioxidant
S. Sequestrant
List II: (Purposes)
I. Prolongs shelf life by protecting against deterioration caused by oxidation.
II. Forms or maintains a uniform mixture of two or more immiscible phases.
III. Controls the availability of metallic cations.
IV. Prolongs shelf life by protecting against deterioration caused by microorganisms.
(A) P-II, Q-IV, R-I, S-III
(B) P-I, Q-II, R-III, S-IV
(C) P-IV, Q-III, R-II, S-I
(D) P-II, Q-I, R-IV, S-III

106. What is the best answer defining the purpose of the "GRAS" (Generally Recognized As Safe) designation in food safety terminology, historically referenced in additive regulation?
(A) It identifies substances considered safe by experts under intended conditions of use to ease regulation.
(B) It legally permits the unrestricted use of synthetic and artificial chemical coloring agents in infant food formulations.
(C) It classifies processed food products that have been proven to be completely immune to any forms of microbial spoilage.
(D) It strictly restricts and regulates the commercial sale of raw agricultural commodities across state borders.

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of the retail consumer.
(B) A recall is initiated to remove unsafe food from the supply chain.
(C) The FBO must inform the Food Authority before or immediately upon initiating a recall.
(D) The FBO must maintain records of the recalled products and their disposal.

123. Match the Recall Classifications (List I) with their corresponding hazard descriptions (List II).
List I: (Recall Classifications)
P. Class I Recall
Q. Class II Recall
R. Class III Recall
List II: (Hazard Descriptions)
I. Consumption may cause temporary or medically reversible adverse health consequences.
II. Consumption is not likely to cause adverse health consequences, but violates standards (e.g., minor labelling error).
III. Consumption will cause serious adverse health consequences or death.
(A) P-III, Q-I, R-II
(B) P-I, Q-II, R-III
(C) P-III, Q-II, R-I
(D) P-II, Q-III, R-I

124. In regulatory terminology, "Food Recall" is defined as:
(A) The standard physical process of manually modifying or correction of a food label directly in the supermarket.
(B) The action to remove food from the supply chain, including from consumers, when it poses a safety risk.
(C) A mandatory federal environmental tax imposed directly on all unsold commercial retail inventory items.
(D) The voluntary process of refunding purchase money to consumers who complain about tasteless or dry food.

125. An FBO discovers that a specific batch of canned beans was under-processed, carrying a high risk of Clostridium botulinum toxin. Applying the Food Safety and Standards (Food Recall Procedure) Regulations, what is the immediate required action?
(A) Immediately initiate a Class I recall, notify FSSAI, and inform the public to stop consumption.
(B) Send a formal written request to the local municipal police station to arrest the plant production manager.
(C) Wait for official written consumer complaints to systematically verify if the active toxin is actually present.
(D) Relabel the affected cans with a significantly longer shelf life and sell them to wholesale markets at a discount.

126. Analyze the Assertion (A) and Reason (R) given below, and choose the correct option.
Assertion (A): An effective traceability system is a fundamental prerequisite for conducting a successful food recall.
Reason (R): Traceability allows the FBO to quickly identify where the affected batch of raw materials or finished products is located in the supply chain.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

127. Which of the following is a correct statement regarding Food Safety Management Systems (FSMS)?
(A) FSMS implementation is a strict statutory requirement that is mandatory only for large multi-national corporations.
(B) Having an active and certified FSMS program completely eliminates the legal requirement for obtaining an FSSAI license.
(C) FSMS plans are individually drafted and approved by the federal Central Advisory Committee for each specific factory.
(D) Every FBO must implement an FSMS plan based on GMP, GHP, and HACCP principles matching their business scale.

128. An FBO needs to ensure their recall plan is functional without an actual safety incident occurring. What competency must the FBO demonstrate under the Food Safety and Standards Act, 2006?
(A) Randomly shutting down the entire manufacturing factory operations for a week to evaluate idle capacity.
(B) Firing the senior quality control manager without notice to test the operational resilience of lower staff.

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completely bypassing Food Safety and Standards Authority of India (FSSAI) health supplement rules. Under which legal framework does this specific "cure" claim push the product?
(A) It remains solely under FSSA jurisdiction classified as a standard non-standardized proprietary food.
(B) It is automatically reclassified as a raw agricultural commodity governed strictly under the Agricultural Produce Market Committee (APMC) Act.
(C) It is legally and officially classified as a certified organic health food with complete tax exemptions.
(D) It violates FSSA rules and falls under the Drugs and Cosmetics Act due to the therapeutic claim.

144. Which of the following is a correct statement regarding Front of Pack Labelling (FOPL) initiatives discussed by the Food Safety and Standards Authority of India (FSSAI)?
(A) FOPL completely and permanently replaces the statutory need for displaying a detailed nutritional information panel on the back of the pack.
(B) FOPL is a voluntary labeling system that has been made strictly mandatory only for raw fresh agricultural vegetables and fruits.
(C) FOPL intends to provide simple, easy-to-understand nutritional facts on the front panel to promote healthier choices.
(D) FOPL must only display the registered commercial brand logo and the food safety officer's authorized digital signature.

145. A farmer wants to sell packaged pulses under the label "100% Organic". Applying concepts from the Food Safety and Standards Authority of India (FSSAI), what is required?
(A) Simply printing the word "Organic" on the retail label without obtaining any statutory third-party certification.
(B) Certification under NPOP or PGS-India, and bearing the official Jaivik Bharat logo on the package.
(C) Obtaining a basic handwritten recommendation certificate from the local village panchayat or agricultural board only.
(D) Adding synthetic green coloring agents to the outer plastic packaging to physically signify natural origin.

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146. Which of the following is an incorrect statement regarding the recently notified Food Safety and Standards (Ayurveda Aahara) Regulations?
(A) Ayurveda Aahara refers to food prepared in accordance with recipes or ingredients specified in authoritative books of Ayurveda.
(B) These regulations do not cover Ayurvedic drugs or proprietary Ayurvedic medicines.
(C) A special logo has been created by the Food Safety and Standards Authority of India (FSSAI) for Ayurveda Aahara products.
(D) Ayurveda Aahara products are strictly permitted to make claims about curing severe diseases like cancer.

147. Consider the following statements regarding Vegan food regulations by the Food Safety and Standards Authority of India (FSSAI):
Statement I: FSSAI has introduced a dedicated logo for Vegan foods to help consumers easily identify them.
Statement II: Vegan food under FSSAI refers exclusively to foods that contain honey and dairy but no meat.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

148. Which of the following is NOT regulated under the specific Food Safety and Standards (Foods for Infant Nutrition) Regulations?
(A) Infant Milk Substitute
(B) Infant formula
(C) Canned carbonated energy drinks
(D) Processed cereal-based complementary food

149. Identify the correct pair matching the recent Food Safety and Standards Authority of India (FSSAI) certification mark/logo to its intended product category:
(A) +F Logo – Fortified Foods
(B) Jaivik Bharat Logo – Irradiated Foods
(C) Radura Logo – Organic Foods
(D) Brown Triangle Logo – Vegan Foods

150. Stringent specific regulations for infant formula and complementary foods under the Food Safety and Standards Act, 2006 are primarily the cause for which vital effect?
(A) An exponential increase in the commercial marketing and retail sale of synthetic breast milk substitutes.

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(D) P-II, Q-III, R-I, S-IV

136. What is the Best Answer describing the ultimate goal of requiring FBOs to implement a Food Safety Management System (FSMS)?
(A) To generate maximum administrative employment opportunities for third-party auditing firms in the food industry.
(B) To increase the government's treasury revenue through the collection of heavy mandatory licensing and audit fees.
(C) To proactively prevent hazards rather than relying solely on end-product testing.
(D) To completely eliminate the legal and administrative need for the Food Safety and Standards Authority of India.

137. Which of the following is an incorrect pair in the context of food recall terminology?
(A) Mock Recall – A simulated recall to test the speed and effectiveness of tracking systems.
(B) Voluntary Recall – Recall initiated by the FBO independently without any direct regulatory order.
(C) Mandatory Recall – Recall directed by the regulatory authority due to severe health concerns.
(D) Shadow Recall – A legal provision where FSSAI secretly confiscates goods at night

138. Analyze the Assertion (A) and Reason (R) given below, and choose the correct option.
Assertion (A): The Food Authority can mandate an FBO to initiate a product recall if the FBO fails to do so voluntarily despite evidence of a severe health hazard.
Reason (R): Section 28 of the Food Safety and Standards Act, 2006 empowers the regulatory authority to intervene and ensure public safety when an FBO is non-compliant or negligent.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

139. Implementing an effective, science-based Food Safety Management System (FSMS) plan is a major cause that produces which of the following long-term effects for a food business?
(A) Increased likelihood of experiencing direct criminal prosecution by local municipal health authorities.
(B) Significant reduction in contaminated products and subsequent market recalls.
(C) A mandatory and permanent increase in the retail market price of all processed food products by exactly 20%.
(D) Total and permanent statutory exemption from paying any annual FSSAI licensing or registration renewal fees.

140. In recent Food Safety and Standards Authority of India (FSSAI) compliance requirements, what does the acronym "FoSTaC" stand for?
(A) Food Safety and Technical Audit Council
(B) Food Safety Training and Certification
(C) Food Standards Testing and Calibration
(D) Federal Organization for Systematic Testing and Certification

141. Consider the following amendments and regulations relating to food packaging under the Food Safety and Standards Authority of India (FSSAI):
I. Prohibition of the use of recycled plastics for packaging of ready-to-eat foods.
II. Prohibition of the use of newspaper for wrapping or serving food.
III. Mandatory use of food-grade packaging materials.
IV. Complete ban on all forms of glass packaging.
Which of the above statements are correct?
(A) I, II, and III
(B) I, II, and IV
(C) II, III, and IV
(D) I and III only

142. Under the specific Food Safety and Standards Authority of India (FSSAI) regulations, a "Novel Food" is defined as:
(A) Any processed food product imported into India from nations situated completely outside the continent of Asia.
(B) High-value food that is prepared and served exclusively in certified five-star fine-dining restaurants only.
(C) Food without a history of human consumption or produced by a newly developed process.
(D) Food that is manufactured using entirely synthetic chemical processes and contains no natural organic carbon.

143. A company formulates a vitamin capsule and markets it explicitly as a cure for diabetes,

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37. (A) The registering authority must issue the certificate within 7 days or reject it with written reasons.
Under the Food Safety and Standards Regulations, the registering authority must process registration applications from petty food businesses efficiently. They must either issue the registration certificate or reject the application, providing written reasons, within seven days of receipt. This fast-track process minimizes administrative barriers for small-scale vendors while maintaining basic safety oversight.

38. (D) Cancel or suspend the license of the FBO after giving an opportunity to show cause.
If a food business operator fails to comply with an improvement notice issued by the enforcement authorities, the Designated Officer has the legal power to suspend or cancel their license. This administrative action must be preceded by giving the operator a reasonable opportunity to show cause, ensuring procedural fairness before finalizing the penalty.

39. (B) I, II, and III
Under FSSAI regulations, valid licensing conditions require operators to maintain factory records regarding production and raw materials, ensure raw materials meet optimum quality standards, and employ at least one technical person to supervise production. Providing free meals to inspecting officers is not a valid condition and constitutes an illegal practice under public servant conduct rules.

40. (C) Food Safety Management System (FSMS)
A Food Safety Management System is a comprehensive, structured plan implemented by food business operators to control hazards. It integrates prerequisite programs, such as Good Manufacturing Practices and Good Hygienic Practices, with Hazard Analysis Critical Control Point principles, ensuring systematic control of physical, chemical, and biological risks throughout the food preparation and distribution processes.

41. (D) A cooperative society processing 10,000 liters of milk per day.
The Food Safety and Standards Act, 2006 exempts basic domestic consumption and traditional farm activities like small-scale jaggery making from licensing. However, any cooperative society processing ten thousand liters of milk per day represents a commercial dairy operation. Such large-scale milk processing exceeds petty limits and must obtain a state or central food license.

42. (A) II, IV, I, III
The standard procedural workflow for obtaining a food license follows a structured sequence. The operator first submits a complete application with the fee. Next, the licensing authority scrutinizes the documents. A Food Safety Officer then conducts a pre-license physical inspection of the premises. Finally, the Designated Officer issues the license or rejects the application.

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43. (B) Designated Officer – Issuing or canceling food business licenses
Under the Food Safety and Standards Act, 2006, the Designated Officer is the key administrative authority responsible for issuing, suspending, or canceling food business licenses within a specified district. Other roles are distinct: the Commissioner heads state administration, Food Analysts perform chemical testing, and Food Safety Officers carry out field inspections and collect samples.

44. (C) Statement I is true but Statement II is false.
A Designated Officer can suspend a food license if an operator fails to comply with an improvement notice. However, suspension is a temporary measure, and the license can be restored once the operator rectifies the non-compliances and satisfies safety standards, making the first statement true and the second statement false.

45. (A) P-II, Q-III, R-I, S-IV
Different food business categories fall under specific licensing authorities. Large-scale exporters and proprietary food manufacturers require a Central License. Medium-scale operations, such as a dairy processing two thousand liters of milk daily, are licensed by the State Authority. Petty vendors with a turnover under twelve lakh rupees require registration from the local authority.

46. (C) To inspect premises, draw samples, and ensure compliance with sanitary and hygienic requirements.
During routine inspections, the primary role of a Food Safety Officer is to inspect food premises, draw samples for analysis, and ensure compliance with sanitary and hygienic requirements under the law. FSOs act as enforcement and guidance officers to protect public health, rather than

(B) The implementation of a complete and permanent federal ban on the importation of all foreign dairy products.
(C) A severe decrease in the domestic manufacturing capacity of all standardized and proprietary infant foods.
(D) Enhanced protection of infants from nutritional deficits and microbiological hazards.

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(C) Conducting a mock recall periodically to test system efficiency and traceability.
(D) Withholding raw material payments to active agricultural suppliers to test the strength of vendor contracts.

129. Consider the following steps in a food recall process:
I. Identification of the hazard and affected batches.
II. Notification to the competent authority (FSSAI/DO).
III. Isolation of recalled products in a secure area.
IV. Repackaging the unsafe food under a different brand name.
Which of the above are legally compliant steps in a recall?
(A) I, II, and III
(B) I, III, and IV
(C) II, III, and IV
(D) I and II only

130. The application of standard protocols (such as ISO 22000) by an FBO to control hazards and ensure regulatory compliance is a direct implementation of the concept of:
(A) Total Quality Management (TQM) framework
(B) Life Cycle Assessment (LCA) methodology
(C) Lean Six Sigma
(D) Food Safety Management System (FSMS)

131. Which of the following components is NOT generally considered a part of a Food Safety Management System (FSMS) plan under Schedule 4 of the Food Safety and Standards regulations?
(A) Stock market investment portfolio of the FBO.
(B) Personal hygiene and health standards of active food handlers.
(C) Pest control and monitoring systems inside the production area.
(D) Cleaning, sanitation, and waste management records of the plant.

132. Arrange the sequence of actions an FBO must take upon deciding to recall a product:
I. Notify consumers via media if the product has reached retail.
II. Assess the scope of the hazard and trace the batch.
III. Dispose of or rectify the recovered product under supervision.
IV. Inform the regulatory authority (FSSAI) about the recall plan.
(A) II, IV, I, III
(B) I, II, III, IV
(C) II, I, IV, III
(D) IV, II, III, I

133. Identify the correct pair representing the regulatory tool and its primary objective under recent Food Safety and Standards Authority of India (FSSAI) initiatives:
(A) FoSTaC – Training and certification of food safety supervisors
(B) RUCO – Regulating the physical import of genetically modified food crops.
(C) Eat Right India – Enforcing heavy state taxation on high-sugar food products.
(D) Clean Street Food Hub – Banning all local street food vendors on a global scale.

134. Consider the following statements regarding third-party food safety audits:
Statement I: The Food Safety and Standards Authority of India (FSSAI) recognizes independent auditing agencies to audit food businesses, reducing the burden of routine regulatory inspections for compliant FBOs.
Statement II: A third-party audit report guarantees permanent immunity from FSO sampling.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

135. Match the recent FSSAI initiatives/regulations (List I) with their core themes (List II).
List I: (FSSAI Initiatives/Regulations)
P. RUCO
Q. BHOG
R. FoSTaC
S. Jaivik Bharat
List II: (Core Themes)
I. Food Safety Training and Certification
II. Repurpose Used Cooking Oil
III. Organic Food Certification Logo
IV. Blissful Hygienic Offering to God (Places of Worship)
(A) P-II, Q-IV, R-I, S-III
(B) P-I, Q-II, R-III, S-IV
(C) P-IV, Q-I, R-II, S-III

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provides scientific advice and technical support to the Central Government, and formulates standards for additives and contaminants. However, it does not possess any legal authority to directly arrest or prosecute consumers for wasting food at commercial establishments.

10. (A) The process of weighing policy alternatives in consultation with stakeholders to select proper prevention and control options.
Within the risk analysis framework of food safety, risk management is defined as the policy-oriented phase. It involves weighing policy alternatives in consultation with interested parties, considering risk assessment and other legitimate factors. This process ensures the selection of appropriate prevention, mitigation, and control options to safeguard public health and regulate food businesses effectively.

11. (B) Animal feed
Section 3 of the Food Safety and Standards Act, 2006 defines food broadly to include substances processed, partially processed, or unprocessed for human consumption. It explicitly includes alcoholic beverages, chewing gum, and manufacturing ingredients. However, animal feed is excluded from this definition as it is not intended for human consumption, falling under separate veterinary regulations.

12. (A) II, I, III, IV
Historical food safety regulations in India follow a specific chronological sequence of enactment. The Prevention of Food Adulteration Act was enacted in 1954, followed by the Meat Food Products Order in 1973. Subsequently, the Milk and Milk Products Order was introduced in 1992, and finally, the comprehensive Food Safety and Standards Act was passed in 2006.

13. (A) Central Advisory Committee – Ensuring close cooperation between the Food Authority and enforcement agencies
Under the Food Safety and Standards Act, 2006, the Central Advisory Committee is mandated to ensure close cooperation between the Food Authority and enforcement agencies. This body assists in prioritizing work, identifying potential risks, and sharing information. Other bodies like Scientific Panels or Committees focus on scientific risk assessment rather than direct business licensing or local dispute resolution.

14. (C) Statement I is true but Statement II is false.
The Chairperson of the Food Safety and Standards Authority of India must be an eminent person in food science or an administrator who held a rank not below Secretary to the Government of India. However, the appointment is made by the Central Government, not by any State Government, making the first statement true and the second false.

15. (A) P-III, Q-I, R-II, S-IV
Prior to the consolidation of food laws in 2006, different ministries regulated various sectors. The Ministry of Health and Family Welfare administered the Prevention of Food Adulteration Act. The Ministry of Food Processing Industries managed the Fruit Products Order. The Ministry of Agriculture oversaw the Meat Food Products Order, while the Department of Animal Husbandry and Dairying regulated milk products.

16. (C) To provide scientific advice, coordinate Scientific Panels, and offer opinions on multi-disciplinary issues.
Under the Food Safety and Standards Act, 2006, the Scientific Committee is established to provide scientific opinions and advice to the Food Authority. It consists of the chairpersons of all independent Scientific Panels and other experts. It coordinates the work of these panels and addresses multi-disciplinary scientific issues, ensuring standards are based on robust scientific evidence.

17. (B) Extraneous Matter – Ingredients intentionally added to enhance the nutritional value of food
The definitions under the Food Safety and Standards Act, 2006 maintain strict legal boundaries. Extraneous matter refers to any foreign substance accidentally or naturally present in food, not intentionally added ingredients designed to enhance nutritional value. Misbranded, sub-standard, and unsafe foods are correctly defined based on labeling violations, quality parameters, and health risks, respectively.

18. (A) Both A and R are true and R is the correct explanation of A.
The Food Authority relies heavily on the Scientific Panels and the Scientific Committee to formulate safety regulations. The Food Safety and Standards Act, 2006 explicitly mandates that national standards must be based on scientific evidence and independent advice. This scientific

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ANSWERS

1. (B) The Prevention of Food Adulteration Act, 1954
The Prevention of Food Adulteration Act, 1954 served as the primary food safety legislation in India before the enactment of the Food Safety and Standards Act, 2006. It aimed to prevent the adulteration of food products and ensure public health safety. The 2006 Act consolidated this law along with several other food-related orders into a single integrated statute.

2. (D) To regulate the market pricing and inter-state distribution of raw agricultural commodities.
The Food Safety and Standards Act, 2006 concentrates on human health safety by consolidating multiple laws, establishing a unified regulator, and laying down science-based standards for manufacturing, storage, and distribution. Regulating the market pricing and inter-state distribution of raw agricultural commodities falls under agricultural market laws, which is outside the safety-centric mandate of this legislation.

3. (A) P-III, Q-I, R-IV, S-II
Under the Food Safety and Standards Act, 2006, specific definitions categorize legal concepts. A food business includes commercial undertakings processing or distributing food. An adulterant is any substance making food unsafe or sub-standard. A contaminant represents any unintentional substance present from environmental or production contexts. A hazard constitutes any biological, chemical, or physical agent causing adverse health effects.

4. (C) Assurance that food will not cause harm to the consumer when prepared and eaten according to its intended use.
The statutory definition of food safety under Indian law focuses on protecting public health during consumption. It defines safety as the assurance that food will not cause harm or injury to the consumer when it is prepared and consumed according to its intended use. This standard aligns with international principles of preventive food safety management systems.

5. (A) Yes, as packaged drinking water and natural mineral water are explicitly included in the statutory definition.
The definition of food under Section 3 of the Food Safety and Standards Act, 2006 explicitly includes packaged drinking water and natural mineral water. Therefore, any enterprise packaging and selling raw borewell water under these labels must comply with the safety, hygiene, and compositional standards mandated by the central authority, bringing it fully under legal oversight.

6. (A) Both A and R are true and R is the correct explanation of A.
The Food Safety and Standards Act, 2006 consolidated several separate food-related orders, including the Fruit Products Order, 1955 and the Meat Food Products Order, 1973. This legislative consolidation aimed to transition from a fragmented, multi-departmental administrative control system to a single, unified reference point for food safety regulations, making both statements true and logically linked.

7. (B) It consists of a Chairperson and 22 members, out of which at least one-third shall be women.
Section 5 of the Food Safety and Standards Act, 2006 mandates the exact composition of the central Food Authority. It consists of a Chairperson and twenty-two members appointed by the Central Government. The statute explicitly requires that at least one-third of these members must be women, ensuring diverse representation in national food safety policy formulation.

8. (C) The Food Business Operator (FBO)
The Food Safety and Standards Act, 2006 explicitly places the primary legal responsibility for safety compliance directly on the Food Business Operator. The operator must ensure that the food satisfies all statutory requirements at every stage of production, processing, import, distribution, and retail, maintaining strict adherence to safety standards within their operational control.

9. (C) I, II, and IV
The Food Safety and Standards Authority of India possesses diverse statutory functions. It specifies procedures for accrediting certification bodies,

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officio members of this committee, making both statements accurate under the Act.

28. (B) Foreign regulatory authorities
The Central Advisory Committee consists of representatives from domestic stakeholder groups, including the food industry, agriculture, consumers, and scientific bodies, alongside state food safety commissioners. Foreign regulatory authorities are not eligible for membership in this committee, as it is a domestic statutory body designed to coordinate national enforcement and prioritize regulatory work within India.

29. (A) Commissioner of Food Safety – Heads the food safety administration of the State
Under the Food Safety and Standards Act, 2006, the Commissioner of Food Safety is appointed by the State Government to head the food safety administration of that state. Other roles, such as the Designated Officer, manage local licensing, while Food Safety Officers perform inspections and sample collection, establishing a clear hierarchical structure for local enforcement.

30. (C) Multiplicity of food laws and regulatory ministries creating confusion and hindering growth.
The transition to the Food Safety and Standards Act, 2006 was driven by the multiplicity of existing food laws and regulatory ministries. Before 2006, food regulations were fragmented across various departments, causing administrative confusion and hindering industry growth. Consolidating these laws into a single act established a streamlined, science-based regulatory framework under one authority.

31. (D) Sub-Divisional Officer
Section 36 of the Food Safety and Standards Act, 2006 specifies that the Commissioner of Food Safety appoints Designated Officers for each district. The statute mandates that the individual appointed to this administrative role must be an officer not below the rank of a Sub-Divisional Officer or equivalent, ensuring competent local supervision of food safety enforcement.

32. (C) A license remains valid forever once issued, provided the FBO pays an annual fee.
Under the Food Safety and Standards Regulations, a license is issued for a specific period of one to five years, based on the request of the operator. It does not remain valid indefinitely. Food business operators must actively apply for renewal at least thirty days before the expiry date to avoid late fees or potential license suspension.

33. (A) P-II, Q-I, R-III, S-IV
The Food Safety and Standards Rules prescribe specific administrative forms for regulatory processes. Form A is used for applying for basic registration, while Form B is the application for a license. Form C represents the physical format of the issued license document, and Form D is the template used by operators for submitting mandatory annual returns.

34. (D) Manufactures or sells food himself with an annual turnover not exceeding ₹12 lakhs.
Under the Food Safety and Standards (Licensing and Registration of Food Businesses) Regulations, 2011, a petty food manufacturer is defined as an operator who manufactures or sells food themselves. To qualify for this category, their annual business turnover must not exceed twelve lakh rupees. Such small-scale operators are exempt from licensing but must obtain a local registration.

35. (A) The FBO must apply for a modification of the license before initiating production in the new line.
When a food business operator intends to significantly alter their manufacturing premises or add a new production line, they must formally apply for a modification of their existing license. This regulatory step ensures that the licensing authority evaluates the changes for potential food safety hazards and structural compliance before commercial production can legally resume.

36. (A) Both A and R are true and R is the correct explanation of A.
Large-scale food manufacturing units, importers, and 100% Export Oriented Units are required to obtain a Central License rather than a State License. Central licensing ensures that high-capacity producers and complex cross-border operations comply with uniform national safety standards, facilitating streamlined trade and consistent enforcement, making both statements true and logically aligned.

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backing ensures that the regulations are objective, protective of public health, and legally defensible under global trade rules.

19. (A) The establishment of a single reference point for all matters relating to food safety and standards.
The primary effect of consolidating multiple historical food laws and orders into the Food Safety and Standards Act, 2006 was the creation of a single reference point. This unified legal framework eliminated administrative overlaps, simplified compliance for businesses, and established a single regulatory authority to oversee food safety standards and enforcement across the country.

20. (C) 2011
Although the Food Safety and Standards Act was passed by Parliament in 2006, the comprehensive Food Safety and Standards Rules were formally notified in 2011. This notification established the operational framework for licensing, registration, administrative enforcement, sampling protocols, and food analysis, marking the complete transition to the modernized regulatory regime across all states in India.

21. (B) I and III only
The Food Safety and Standards Act, 2006 regulates food business operators, including fruit hawkers and multi-national cereal producers. However, farmers selling raw agricultural produce directly from their fields are excluded from licensing requirements. Additionally, synthetic drugs are governed under separate pharmaceutical legislation, namely the Drugs and Cosmetics Act, rather than food safety laws.

22. (D) Any material used for making food unsafe, sub-standard, mis-branded, or containing extraneous matter.
Under Section 3 of the Food Safety and Standards Act, 2006, an adulterant is legally defined as any material which is or could be employed for making food unsafe, sub-standard, mis-branded, or containing extraneous matter. This broad statutory definition ensures that any substance introduced to compromise food quality or integrity can be prosecuted under adulteration laws.

23. (B) They must obtain a Registration Certificate from the local authority.
Under the Food Safety and Standards (Licensing and Registration of Food Businesses) Regulations, 2011, food businesses with an annual turnover of less than twelve lakh rupees are classified as petty food businesses. These small-scale operators are not required to obtain a formal license but must register with the local registration authority to ensure basic hygiene compliance.

24. (C) The Food Authority establishes Scientific Panels consisting of independent scientific experts.
Under Section 13 of the Food Safety and Standards Act, 2006, the Food Authority is mandated to establish multiple Scientific Panels. These panels consist of independent scientific experts specializing in fields like additives, contaminants, or labeling. They provide essential scientific advice and draft safety standards, maintaining independence from commercial food industry interests or direct political interference.

25. (D) Traceability
The regulatory requirement to track food products through all stages of production, processing, and distribution is termed traceability. Under the Food Safety and Standards Act, 2006, traceability systems allow food business operators and regulators to quickly identify and locate products in the supply chain, which is essential for managing safety hazards and conducting targeted product recalls.

26. (A) The CEO holds final power to pass national legislations independently of Parliament.
The Chief Executive Officer of the Food Safety and Standards Authority of India is the administrative head appointed by the Central Government. The CEO manages day-to-day administration, executes decisions, and legally represents the Food Authority. However, the CEO has no independent legislative power to pass national laws, as that authority remains exclusively with Parliament and the Food Authority Board.

27. (A) Both Statement I and Statement II are true.
The Central Advisory Committee is established to ensure close cooperation between the central Food Authority and state-level enforcement agencies. Its members include representatives from agriculture, industry, consumers, and ex-officio members. The Commissioners of Food Safety of all States and Union Territories are ex-

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directly collecting cash fines or managing business operations.

47. (D) Section 37 – Powers of Food Analyst
Under the Food Safety and Standards Act, 2006, Section 38 details the powers of the Food Safety Officer, which include seizing non-compliant food and destroying highly perishable unsafe food. However, Section 37 actually governs the appointment of the Food Safety Officer, not the powers of the Food Analyst, making that pair incorrect.

48. (A) Both A and R are true and R is the correct explanation of A.
The Food Safety Officer is legally empowered to seize any article of food that appears to contravene the safety regulations. This seizure power is a preventive enforcement tool designed to stop potentially unsafe or non-compliant food from entering the supply chain and reaching consumers, making both the assertion and reason true and logically connected.

49. (B) The FBO commits a punishable offense liable to imprisonment and a fine.
Under the Food Safety and Standards Act, 2006, obstructing, intimidating, or impersonating a Food Safety Officer during the discharge of their official duties is a serious legal offense. Any operator found guilty of such actions faces criminal liability, which includes a sentence of imprisonment and a substantial monetary fine determined by a court of law.

50. (C) 60 days
According to the Food Safety and Standards (Licensing and Registration of Food Businesses) Regulations, 2011, the licensing authority must either issue the license or reject the application within sixty days from the receipt of a complete application. This timeframe includes the period required for document scrutiny and physical inspection of the premises.

51. (A) I, II, and III
A Food Safety Officer is responsible for inspecting licensed manufacturing premises, drawing food samples for laboratory analysis, and maintaining a database of food businesses within their jurisdiction. Approving scientific standards for novel foods, however, is a central policy function belonging exclusively to the Food Authority, not a local field duty of an FSO.

52. (C) An officer appointed by the Commissioner of Food Safety to manage administration in a specified area.
Under the Food Safety and Standards Act, 2006, a Designated Officer is an administrative official appointed by the state's Commissioner of Food Safety. The DO is placed in charge of food safety administration for a specified district or area, supervising local Food Safety Officers, processing license applications, and sanctioning prosecutions.

53. (A) Seize the adulterated wheat flour, issue a receipt, and keep it in safe custody.
When a Food Safety Officer detects visible insect infestation and mold in stored wheat flour, they must act to prevent public distribution. Utilizing statutory powers, the FSO can seize the affected food articles, issue a formal receipt to the operator, and place the seized materials into safe custody for further analysis and legal proceedings.

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54. (D) The FSO must pay the cost of the sample to the person from whom it is taken at the prevailing market rate.
The Food Safety and Standards Act, 2006 mandates that when a Food Safety Officer collects a food sample for official analysis, they must pay its cost to the operator at the prevailing market rate. This requirement ensures that sample collection is conducted fairly and does not cause uncompensated financial loss to the business.

55. (B) Chain of Custody
Chain of custody represents the continuous, documented tracking of a food sample from collection by the officer to delivery at the laboratory. Maintaining this record is a critical legal and scientific requirement under the Act, as it ensures that the sample remains tamper-proof, authentic, and admissible as valid evidence in court proceedings.

56. (C) The DO personally conducts chemical analysis of food samples in the state laboratory.
The Designated Officer is an administrative authority who issues food licenses, investigates complaints against Food Safety Officers, and sanctions prosecutions. However, the DO does not personally perform chemical testing of food samples, as this technical analysis is the exclusive statutory duty of the qualified Food Analyst working within an accredited laboratory.

safety. This modern system allows the authority to target resources toward high-risk food items while facilitating faster customs clearance for low-risk foods with documented histories of compliance, making both the assertion and explanation true and logically connected.

97. (B) Upon non-conformance, the Authorized Officer issues an NCR and the food is denied entry into India.
When an imported food consignment fails laboratory safety or quality standards, the Authorized Officer issues a Non-Conformance Certificate. This certificate denies entry to the consignment, preventing its sale in the domestic market. Such non-compliant food must be either deported back to the exporting country or destroyed under customs supervision.

98. (D) Ordering the consignment to be destroyed or deported back to the exporting nation under supervision.
When an imported consignment of spices is found to be contaminated and fails safety standards, the Authorized Officer must ensure it does not enter the country. The officer possesses the statutory power to order the consignment to be destroyed locally or deported back to the exporting nation under strict customs supervision to protect consumers.

99. (A) I, II, and IV
Under the regulations, novel foods must obtain prior product approval from FSSAI, submit safety data and detailed risk assessment studies, and have no history of safe human consumption in India. Financial cheapness is a market factor and is not a regulatory requirement for safety evaluation and approval of these innovative food products.

100. (C) Equivalence
In international food trade, equivalence is the principle where the regulatory standards of an exporting nation are accepted by the importing nation. This acceptance occurs if the exporter demonstrates that its measures, though different, achieve the same level of sanitary and phytosanitary protection as the importing country's standards, facilitating smoother cross-border trade.

101. (A) Food imported as a sample for exhibition or research purposes, not for human consumption.
Food imported specifically as samples for exhibitions, research, or scientific evaluation is generally exempt from routine FSSAI No Objection Certificate procedures. Since these items are not intended for human consumption or commercial distribution, they are subject to simplified import declarations, unlike bulk foods meant directly for retail markets.

102. (A) I, II, III, IV
The chronological sequence for clearing imported food involves filing an integrated customs declaration first. Next, the Authorized Officer conducts document scrutiny and visual inspection. The officer then draws physical samples and sends them to an accredited laboratory. Finally, the officer issues either an NOC or an NCC based on the test results.

103. (B) Maximum Permitted Level (MPL) – The highest legally acceptable concentration of an additive in a food category
Under food additive regulations, the Maximum Permitted Level is the highest legally acceptable concentration of a specific additive allowed in a food category. Other terms are distinct: GMP represents usage restricted to technological necessity, ADI is the daily intake considered safe over a lifetime, and processing aids must not remain active in the final product.

104. (C) Statement I is true but Statement II is false.
Non-specified food ingredients and novel foods require prior safety approval from FSSAI before they can be manufactured or imported, making the first statement true. However, standardized foods that already conform to existing national regulations do not need individual product approval before launch, as they comply with pre-established standards, making the second statement false.

105. (A) P-II, Q-IV, R-I, S-III
Different functional classes of food additives serve specific roles. Emulsifiers help maintain a uniform mixture of immiscible phases. Preservatives protect food against microbial deterioration to extend shelf life. Antioxidants prevent deterioration caused by oxidation, while sequestrants act chemically to control the availability of metallic cations, maintaining food stability and quality.

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67. (A) The Food Authority may recognize any laboratory accredited by the National Accreditation Board (NABL).
The Food Safety and Standards Authority of India recognizes testing laboratories accredited by the National Accreditation Board for Testing and Calibration Laboratories. This policy ensures that both public and private testing facilities comply with uniform international quality standards, providing reliable, high-quality analytical data for enforcement and compliance monitoring across the nation.

68. (C) Using a clean, dry container and sealing it properly to prevent leakage and tampering.
When collecting a sample of loose edible oil, the Food Safety Officer must demonstrate high technical competence by using clean, dry containers. Properly sealing the sample prevents leakage, degradation, and external tampering. This standard protocol preserves the analytical integrity of the oil, ensuring the test results are legally valid during subsequent enforcement proceedings.

69. (B) I, II, and IV
A Referral Food Laboratory is responsible for analyzing appeal samples sent by the Designated Officer, investigating standards for food articles, and training Food Analysts. However, issuing manufacturing licenses to multi-national corporations is an administrative function of the Central Licensing Authority and does not fall under the technical duties of a scientific referral laboratory.

70. (D) Chain of Custody
Chain of custody is the systematic process that ensures a food sample is securely handled, tracked, and stored from collection to analysis. This documented trail prevents tampering, contamination, or substitution, maintaining the sample's legal integrity. It is vital for ensuring that laboratory test results remain admissible as reliable evidence during judicial prosecution.

71. (B) Sanctioning prosecution against the FBO based on the analysis report.
A Food Analyst is responsible for receiving and analyzing samples, declaring the analytical methods used, and sending reports to the Designated Officer within fourteen days. However, the analyst has no statutory authority to sanction prosecution against operators. That administrative power belongs exclusively to the Designated Officer or the state's Commissioner of Food Safety.

72. (A) III, I, II, IV
The regulatory workflow for food sampling and analysis follows a strict chronological sequence. First, the officer serves a written notice of intention to sample. Next, the officer collects, divides, and seals the sample. The Food Analyst then conducts the testing and sends the report, which the Designated Officer finally reviews to decide on prosecution.

73. (B) 14 days
Under normal circumstances, the Food Analyst must complete the scientific testing of a sample and send the analysis report to the Designated Officer within fourteen days. This strict time limit ensures speedy administrative action and prevents undue delays in resolving potential food safety violations. It is a critical safeguard for both consumers and business operators.

74. (C) Statement I is true but Statement II is false.
If a Food Analyst cannot complete sample testing within fourteen days, they must formally notify the Designated Officer of the delay, making the first statement true. However, an analytical delay does not automatically acquit the operator of potential charges, as extensions are legally permitted for complex testing procedures, making the second statement false.

75. (A) P-I, Q-III, R-II, S-IV
The enforcement of penalties is divided based on the severity of the non-compliance. Minor technical violations like sub-standard food, misbranding, or failing to comply with directions are adjudicated by the Adjudicating Officer through monetary penalties. However, severe offenses like manufacturing unsafe food causing grievous injury are prosecuted before a Judicial Magistrate or Special Court.

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76. (B) To have one part for primary analysis, two for the DO's safekeeping, and one for the FBO's independent testing.
Dividing a collected food sample into four parts is a procedural safeguard under the regulations. One part goes to the Food Analyst for primary testing, two parts are stored securely by the Designated Officer for potential referral analysis, and one

136. (C) To proactively prevent hazards rather than relying solely on end-product testing.
The ultimate goal of requiring food businesses to implement a Food Safety Management System is to proactively prevent hazards throughout the production process. By controlling risks at critical stages, an FSMS shifts the focus from relying solely on end-product testing to establishing continuous, preventive assurance of safety for consumers.

137. (D) Shadow Recall – A legal provision where FSSAI secretly confiscates goods at night
In food safety terminology, voluntary, mandatory, and mock recalls are legally defined concepts used to manage unsafe products. However, shadow recall is not a recognized legal provision or term under FSSAI regulations, making it an incorrect and fabricated pair within the context of standard recall procedures.

138. (A) Both A and R are true and R is the correct explanation of A.
The Food Authority can legally mandate an operator to initiate a recall if they fail to do so voluntarily despite evidence of a severe health hazard. This intervention is empowered by Section 28 of the Act, which prioritizes public safety and authorizes regulatory action when operators are negligent, making both statements true and connected.

139. (B) Significant reduction in contaminated products and subsequent market recalls.
Implementing a science-based Food Safety Management System plan produces a significant reduction in contaminated products and subsequent market recalls. By systematically identifying and controlling hazards at critical points during processing, an FSMS ensures consistent food safety, protecting the brand's reputation and reducing the likelihood of facing regulatory penalties.

140. (B) Food Safety Training and Certification
Under FSSAI compliance requirements, the acronym FoSTaC stands for Food Safety Training and Certification. This large-scale initiative is designed to train and certify food safety supervisors across various sectors of the food industry, ensuring that businesses maintain trained personnel who understand sanitary, hygienic, and regulatory requirements.

141. (A) I, II, and III
FSSAI packaging regulations prohibit the use of recycled plastics for ready-to-eat foods, ban the use of newspapers for wrapping or serving food, and mandate the use of food-grade packaging materials. However, there is no complete ban on glass packaging, which remains a widely accepted and safe material for many products.

142. (C) Food without a history of human consumption or produced by a newly developed process.
Under the specific FSSAI regulations, a novel food is defined as food or a food ingredient that does not have a history of safe human consumption in India, or is produced by a newly developed technological process that significantly alters its composition, structure, or safety profile, requiring prior product approval.

143. (D) It violates FSSA rules and falls under the Drugs and Cosmetics Act due to the therapeutic claim.
When a manufacturer claims a vitamin supplement cures a disease like diabetes, the product violates the Food Safety and Standards Act. Making therapeutic cure claims is prohibited for food products, pushing the item under the jurisdiction of the Drugs and Cosmetics Act, which regulates medicinal and therapeutic substances.

144. (C) Its intent is to provide simple, easy-to-understand nutritional facts on the front panel to promote healthier choices.
Front of Pack Labelling initiatives aim to provide simple, easy-to-understand nutritional information on the front panel of food packages. This system is designed to help consumers make healthier food choices by highlighting key parameters like fats, sugars, and salt, complementing the detailed nutritional panel on the back of the package.

145. (B) Certification under NPOP or PGS-India, and bearing the official Jaivik Bharat logo on the package.
To market packaged pulses as organic in India, the producer must obtain certification under either the National Programme for Organic Production or the Participatory Guarantee System for India. Additionally, the final package must bear the official Jaivik Bharat logo, which is the unified certification mark for organic foods under FSSAI.

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in factories is incorrect, as sample collection is an administrative duty.

87. (A) Both Statement I and Statement II are true.
The regulatory enforcement framework divides cases based on severity. The Adjudicating Officer only possesses jurisdiction over civil violations punishable solely by monetary penalties, making the second statement true. Severe criminal offenses, such as manufacturing unsafe food that carries prison sentences, must be prosecuted in regular judicial courts, making the first statement true as well.

88. (C) Manufacturing unsafe food causing grievous injury.
The Adjudicating Officer has jurisdiction over civil cases involving monetary penalties, such as selling sub-standard food, containing non-toxic extraneous matter, or operating unhygienic premises. However, manufacturing unsafe food that causes grievous injury is a criminal offense carrying a prison sentence, which falls outside administrative adjudication and must be tried in regular courts.

89. (A) Section 50 – Penalty for selling food not of the nature or substance or quality demanded
The Food Safety and Standards Act, 2006 contains specific penalty provisions. Section 50 prescribes the penalty for selling food not of the nature, substance, or quality demanded by the purchaser. The other listed sections are misaligned: Section 51 actually covers sub-standard food, Section 52 covers misbranding, and Section 53 details penalties for misleading advertisements.

90. (A) Prevention of misleading health claims and protection of the consumer's right to accurate information.
Strict enforcement against misbranding prevents manufacturers from making deceptive health claims on food labels. This regulatory action directly protects the consumer's right to accurate, honest information about the food they purchase. It ensures fair market competition and allows buyers to make informed, safe dietary choices based on verified and standardized product labeling.

91. (B) Non-Objection Certificate (NOC)
When an imported food consignment arrives at an Indian port, the FSSAI Authorized Officer inspects it and draws samples. If the laboratory analysis confirms compliance with national standards, the officer issues a formal Non-Objection Certificate to the customs authorities, legally permitting the consignment to be cleared for domestic distribution.

92. (B) All imported foods are exempt from FSSAI packaging and labelling regulations.
All food products imported into India must comply with the same rigorous packaging and labeling standards as domestic products. The assertion that imports are exempt from these rules is incorrect. Additionally, imports must have a minimum remaining shelf life of sixty percent at clearance, and are subject to inspection and sampling by Authorized Officers.

93. (A) P-I, Q-II, R-III, S-IV
The import clearance process utilizes specialized systems and terminology. FICS represents the Food Import Clearance System, which is integrated with the customs SWIFT portal for facilitating trade. A No Objection Certificate is issued for compliant food consignments, while a Non-Conformance Certificate is generated when imported foods fail to meet safety or labeling standards.

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94. (C) An officer appointed by the FSSAI CEO to perform import clearance functions.
Under the Food Safety and Standards (Import) Regulations, an Authorized Officer is an official appointed by the Chief Executive Officer of FSSAI. This officer is stationed at customs entry points and is responsible for overseeing the inspection, sampling, and clearance of imported food consignments, ensuring they meet national safety standards.

95. (D) The consignment is rejected for failing to meet the mandatory 60% remaining shelf life.
Under the FSSAI import regulations, food consignments must have at least sixty percent of their original shelf life remaining at the time of customs clearance. A cheese consignment with a twelve-month shelf life that has already lost eight months possesses only thirty-three percent remaining shelf life, resulting in mandatory rejection by the Authorized Officer.

96. (A) Both A and R are true and R is the correct explanation of A.
FSSAI applies a risk-based inspection system for food imports to streamline trade and maintain

part is provided to the operator to allow for independent laboratory testing, ensuring fairness.

77. (A) FBO refusal to sign – Renders the sample legally invalid and immune to testing
During the sealing of samples, signatures of the officer and operator or a witness are required on the wrapper, and a paper slip is pasted over the seal. An operator's refusal to sign does not render the sample invalid, as the officer can document the refusal in the presence of witnesses, maintaining legal validity.

78. (A) Both A and R are true and R is the correct explanation of A.
The Food Safety and Standards Act, 2006 distinguishes between civil violations and criminal offenses. It decriminalizes minor technical errors, such as misbranding, by resolving them through monetary penalties decided by an Adjudicating Officer. However, it retains strict criminal liability and jail sentences for severe actions like selling unsafe food, making both statements true.

79. (D) Liability to a civil penalty up to ₹5 Lakhs decided by the Adjudicating Officer.
Under the penalty structure of the Food Safety and Standards Act, 2006, selling sub-standard food that fails to meet specified standards but does not cause injury is treated as a civil violation. The business operator is liable to pay a monetary penalty of up to five lakh rupees, which is adjudicated by the Adjudicating Officer.

80. (B) Up to ₹3 Lakhs
Under Section 52 of the Food Safety and Standards Act, 2006, any person who manufactures, sells, stores, imports, or distributes misbranded food articles is liable to a civil penalty. The statute prescribes that this penalty can extend up to three lakh rupees, which is adjudicated and levied by the local Adjudicating Officer.

81. (A) I, II, and III
When determining the quantum of a monetary penalty, the Adjudicating Officer must consider legally mandated criteria. These include the amount of disproportionate gain or unfair advantage, the scale of loss caused to any person, and the repetitive nature of the default. The political affiliation of the business operator is irrelevant and has no legal standing.

82. (D) It is sold with false, misleading, or deceptive claims printed on the package label.
Under Section 3 of the Food Safety and Standards Act, 2006, a food article is classified as misbranded if it is sold with false, misleading, or deceptive claims printed on its package label. This definition covers inaccurate ingredient listings, misleading nutritional claims, or false statements regarding the product's origin, quality, and therapeutic benefits.

83. (A) Imprisonment of not less than 7 years which may extend to life, and a fine not less than ₹10 Lakhs.
Section 59 of the Food Safety and Standards Act, 2006 prescribes severe criminal punishments for extreme safety violations. If an operator manufactures or sells an unsafe food article that results in the death of a consumer, they face imprisonment of not less than seven years, which may extend to life, along with a heavy fine.

84. (C) The Adjudicating Officer must be an officer not below the rank of Additional District Magistrate (ADM).
Under Section 68 of the Food Safety and Standards Act, 2006, the state government appoints Adjudicating Officers to hear civil food safety cases. The statute requires that the appointed official must be a senior administrative officer holding a rank not below that of an Additional District Magistrate, ensuring experienced judicial oversight of monetary penalties.

85. (A) Penalizing for misbranding and false advertisement.
When a manufacturer prints unapproved therapeutic claims on a health supplement label, such as curing cancer, the regulatory action focuses on misbranding and false advertisement. Under the Food Safety and Standards Act, 2006, making deceptive medical claims on food labels is highly illegal and subjects the business operator to significant civil penalties.

86. (D) The Tribunal is the first responder that collects food samples from factories.
The Food Safety Appellate Tribunal is a judicial body established to hear appeals against decisions made by Adjudicating Officers. The Presiding Officer is a qualified District Judge appointed by the government. The assertion that the Tribunal acts as a first responder collecting physical samples

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106. (A) It identifies substances considered safe by experts under intended conditions of use to ease regulation.
The Generally Recognized As Safe designation is a regulatory classification used for food additives. It identifies substances that experts consider safe under intended conditions of use, based on a long history of safe consumption or scientific consensus. This designation simplifies the regulatory approval process for well-established, non-toxic food ingredients.

107. (B) Calcium – Highly restricted toxic heavy metal in milk
Heavy metal contaminants such as lead, mercury, and arsenic are toxic substances that are strictly monitored and restricted in food products to prevent neurological and systemic damage. However, calcium is an essential nutrient and natural mineral found abundantly in milk, not a toxic heavy metal, making it an incorrect and misaligned pair.

108. (D) A is false but R is true.
Proprietary foods are allowed to contain approved food additives, provided they are within the permitted limits specified for that food category, making the assertion false. The reason is true because proprietary foods do not have individual, detailed standards specified in the regulations, which is why they must use only permitted ingredients and additives.

109. (A) The product is deemed unsafe or sub-standard, leading to product rejection and penal action.
If a manufacturer uses an unapproved food additive, the resulting food product is legally classified as unsafe or sub-standard. This non-compliance leads to direct regulatory action, including product rejection, removal from the market, and civil or criminal penalties for the business operator under the Food Safety and Standards Act, 2006.

110. (C) Principal Display Panel
Under the packaging and labelling regulations, the principal display panel is defined as the part of the package label most likely to be displayed, presented, or examined under customary conditions of retail sale. It must contain key mandatory declarations, such as the product name, vegetarian/non-vegetarian logo, net quantity, and FSSAI license number.

111. (A) I, II, and III
Under FSSAI regulations, mandatory labeling requirements for pre-packaged foods include the name of the food, the list of ingredients in descending order of weight, and detailed nutritional information. The exact profit margin of the manufacturer is a private commercial detail and is not required to be disclosed on the product label.

112. (C) Food for which standards are not specified but is made using permitted ingredients and additives.
Proprietary food is legally defined under the regulations as food for which individual standards have not been specified. However, such products must be manufactured using only permitted ingredients and approved food additives, and they must fully comply with all other generic packaging, labeling, and microbiological safety standards mandated by the authority.

113. (B) A prominent allergen warning must be printed on the label declaring the presence of peanuts.
FSSAI packaging and labelling regulations require the mandatory declaration of common food allergens, including peanuts and tree nuts. If a food product contains peanuts, the manufacturer must print a prominent allergen warning on the label. This warning ensures that sensitive consumers can identify the allergen and avoid adverse health consequences.

114. (D) A brown triangle inside a square indicates non-vegetarian food.
Under the labeling regulations, specific symbols indicate the dietary nature of food. A green circle inside a square represents vegetarian food, while a brown triangle inside a square indicates non-vegetarian food. These standardized symbols must be prominently displayed on the principal display panel of pre-packaged foods, ensuring clear information for consumers.

115. (A) Nutritional Profiling / Information
Under the labeling regulations, calculating the energy value of a food product by summing the calories from carbohydrates, proteins, and fats is a key part of nutritional profiling. This information must be declared on the label to provide consumers with transparent details regarding the nutritional composition and caloric value of the food product.

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57. (C) Statement I is true but Statement II is false.
When collecting a food sample, the Food Safety Officer must serve a written notice of intention to the operator, making the first statement true. However, under the regulations, the collected sample must be divided into four distinct parts, not three, to facilitate primary, administrative, and appellate testing, making the second statement false.

58. (A) Levy and collect monetary penalties directly in cash from the FBO at the time of inspection.
Section 38 of the Food Safety and Standards Act, 2006 empowers the Food Safety Officer to enter premises, seize unsafe food, and break open sealed packages if necessary. However, the FSO is strictly prohibited from levying or collecting monetary penalties directly in cash, as compounding and fine adjudication are handled exclusively by judicial or designated administrative officers.

59. (B) Section 43 – Recognition and accreditation of laboratories
Under the Food Safety and Standards Act, 2006, Section 43 governs the recognition and accreditation of testing laboratories by the Food Authority. Other sections are misaligned: Section 30 defines the functions of the Commissioner of Food Safety, and Section 37 covers the appointment of Food Safety Officers, while liability is detailed in other provisions.

60. (B) It prevents natural decomposition of the sample during transit and storage prior to chemical analysis.
Adding a legally approved preservative to a collected food sample is a standard procedure under food safety rules. This addition prevents natural chemical and biological decomposition during transport and storage before analysis. It ensures that the sample analyzed by the Food Analyst accurately reflects the state of the food at the time of collection.

61. (B) 3
The Food Safety and Standards Rules specify the procedure for dividing food samples. According to the regulatory framework, the collected sample is divided into parts to facilitate primary testing and administrative safekeeping. This division ensures that multiple identical portions are available for reference and independent analysis in case of a dispute, maintaining procedural integrity.

62. (C) The fourth part is analyzed by the FSO on the spot using a portable kit.
During the sample dispatch process, the Food Safety Officer sends one part to the analyst, two parts to the Designated Officer, and keeps the fourth for potential referral testing. The assertion that the fourth part is analyzed on the spot by the FSO is incorrect, as FSOs do not conduct formal chemical analysis in the field.

63. (A) P-II, Q-I, R-III
The divided parts of a food sample serve specific legal functions. Part one is sent directly to the Food Analyst for primary testing. Parts two and three are dispatched to the Designated Officer for safe custody in case of appeal or referral. Part four is reserved for analysis by an accredited laboratory if requested by the operator.

64. (C) A person appointed by the Commissioner of Food Safety to analyze samples for a specified local area.
Under Section 45 of the Food Safety and Standards Act, 2006, a Food Analyst is a qualified professional appointed by the state's Commissioner of Food Safety. The analyst is authorized to conduct chemical and biological testing of food samples collected within their specified local area, ensuring standards are verified scientifically in public laboratories.

65. (B) The FBO can appeal to the Designated Officer to send a retained part to a Referral Laboratory.
If a food business operator disputes the primary findings of a Food Analyst, they have a statutory right to appeal. The operator can request the Designated Officer to send one of the retained sample parts kept in safe custody to a designated Referral Laboratory for definitive scientific testing and confirmation of the quality.

66. (A) Both A and R are true and R is the correct explanation of A.
Under the food safety framework, the certificate issued by the Director of the Referral Food Laboratory supersedes the primary Food Analyst's report. The Referral Laboratory serves as the final appellate body for scientific disputes, ensuring technical accuracy and resolving conflicts regarding sample quality, making both the assertion and reason true and logically linked.

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126. (A) Both A and R are true and R is the correct explanation of A.
An effective traceability system is a fundamental prerequisite for executing a successful food recall. Traceability allows the operator to track the movement of food ingredients and finished products through all stages of production and distribution. This capability ensures that the affected batch is quickly identified and retrieved, making both statements true and logically connected.

127. (D) Every FBO must implement an FSMS plan based on GMP, GHP, and HACCP principles matching their business scale.
Under Schedule 4 of the licensing regulations, every food business operator is required to implement a Food Safety Management System plan. This plan must be based on Good Manufacturing Practices, Good Hygienic Practices, and HACCP principles, adapted to the scale of their business, to ensure consistent control of safety hazards.

128. (C) Conducting a mock recall periodically to test system efficiency and traceability.
To ensure their recall system is functional and efficient without an active safety incident, an operator must periodically conduct a mock recall. This simulated exercise tests the business's ability to trace products quickly, verify records, and coordinate communication, ensuring overall preparedness to handle real food safety emergencies under the regulations.

129. (A) I, II, and III
Legally compliant steps in a recall process include identifying the hazard and affected batches, notifying the competent authority immediately, and isolating the recalled products in a secure area to prevent re-distribution. Repackaging unsafe food under a different brand name is highly illegal and constitutes a major criminal offense under the Act.

130. (D) Food Safety Management System (FSMS)
Implementing structured international standards to control safety hazards and ensure compliance is a direct application of a Food Safety Management System. By incorporating prerequisite sanitary programs with hazard analysis principles, an FSMS provides a preventive framework that systematically reduces risks, ensuring the delivery of safe food products to consumers.

131. (A) Stock market investment portfolio of the FBO.
A Food Safety Management System plan under Schedule 4 focuses on hygienic and operational controls. It includes hygiene standards for handlers, pest control monitoring, and sanitation records. The stock market investment portfolio of the business operator is a private financial asset and has no bearing on food safety management or regulatory compliance.

132. (A) II, IV, I, III
The chronological steps in executing a food recall require structured actions. The operator must first assess the hazard scope and trace the affected batch. Next, they must inform the regulatory authority of the recall plan. They then notify consumers via media to stop consumption, and finally dispose of or rectify the recovered food.

133. (A) FoSTaC – Training and certification of food safety supervisors
Under recent FSSAI initiatives, FoSTaC is the Food Safety Training and Certification program designed to train and certify food safety supervisors in businesses. Other initiatives are misaligned: RUCO focuses on repurposing used cooking oil, Eat Right India promotes healthy eating habits, and Clean Street Food Hub aims to upgrade hygiene standards for street vendors.

134. (C) Statement I is true but Statement II is false.
FSSAI recognizes independent third-party auditing agencies to audit food businesses, which reduces the frequency of routine regulatory inspections for compliant operators, making the first statement true. However, a third-party audit report does not grant permanent immunity from regulatory sampling by Food Safety Officers, making the second statement false.

135. (A) P-II, Q-IV, R-I, S-III
FSSAI has launched diverse initiatives to promote food safety. RUCO stands for Repurpose Used Cooking Oil, which manages biodiesel conversion. BHOG focuses on hygienic offering standards at places of worship. FoSTaC provides structured safety training and certification for food supervisors, and Jaivik Bharat represents the organic certification mark used for compliant organic foods.

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116. (C) The label can legally claim that the formula is medically superior to breast milk.
Labeling regulations for infant foods strictly prohibit any claims suggesting that infant formula is medically superior to breast milk. Under the Infant Milk Substitutes Act and FSSAI rules, labels must feature warnings promoting breastfeeding and must not contain infant pictures or medical claims that could discourage mothers from breastfeeding.

117. (A) Both Statement I and Statement II are true.
Under the regulatory framework, health supplements and nutraceuticals cannot claim to prevent, treat, or cure any human disease, making the first statement true. They must also prominently display the warning "Not for medicinal use" on their labels to prevent consumers from confusing them with pharmaceutical drugs, making the second statement true as well.

118. (D) Single-ingredient raw agricultural commodities like whole wheat grains
While processed foods must display nutritional information, single-ingredient raw agricultural commodities like whole wheat grains are generally exempt from this requirement. Since these products undergo no processing and consist of a single raw ingredient, they are treated as exemptions under the Food Safety and Standards (Labelling and Display) Regulations.

119. (B) Expiry / Use By Date – The date after which food must not be sold or consumed due to safety hazards.
The expiry or use-by date represents the final date after which a food product must not be sold or consumed due to potential safety hazards and quality degradation. This date is critical for perishable foods, whereas the best-before date indicates the period during which the food remains of fully marketable quality but is not toxic.

120. (C) The product is deemed "Misbranded", making the FBO liable for penalties.
When a food brand makes unapproved health claims on its label, such as promising instant fat loss, it violates the regulations. Under the Food Safety and Standards Act, 2006, the product is deemed misbranded due to misleading claims, which makes the food business operator liable to civil penalties adjudicated by the authorities.

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121. (A) Class I
Under the Food Safety and Standards (Food Recall Procedure) Regulations, a Class I recall is initiated when the consumption of a non-compliant food product poses a high risk of causing serious adverse health consequences or death. This classification requires immediate, high-priority action to retrieve the unsafe food from the market and consumers.

122. (A) Recall procedures are solely the responsibility of the retail consumer.
The assertion that recall procedures are the sole responsibility of the retail consumer is incorrect. Under the regulations, the food business operator bears the primary responsibility for initiating and executing recalls, notifying the Food Authority, and safely disposing of recovered products to ensure that unsafe food is removed from the supply chain.

123. (A) P-III, Q-I, R-II
Food recalls are classified based on the severity of the health hazard. Class I recalls involve food that will cause serious health consequences or death. Class II recalls cover products that may cause temporary or medically reversible adverse health issues. Class III recalls involve foods that violate standards but are unlikely to cause adverse health consequences.

124. (B) The action to remove food from the supply chain, including from consumers, when it poses a safety risk.
In food safety regulations, a food recall is defined as the action taken to remove a food product from the supply chain, including from consumers, when it poses a safety risk. This preventive mechanism is vital for stopping the consumption of contaminated, unsafe, or non-compliant food, thereby protecting public health.

125. (A) Immediately initiate a Class I recall, notify FSSAI, and inform the public to stop consumption.
When an operator discovers a severe microbiological hazard in canned beans, they must act immediately under the recall regulations. The operator is required to initiate a Class I recall, notify FSSAI about the hazard, and inform the public to stop consumption, ensuring the rapid removal of the toxic product from the market.

146. (D) Ayurveda Aahara products are strictly permitted to make claims about curing severe diseases like cancer.
The Food Safety and Standards (Ayurveda Aahara) Regulations cover foods prepared according to authoritative Ayurvedic texts but do not include Ayurvedic drugs. However, these food products are strictly prohibited from making therapeutic claims about curing severe diseases like cancer, making the assertion about permitting such cure claims incorrect and illegal.

147. (C) Statement I is true but Statement II is false.
FSSAI has introduced a dedicated logo for Vegan foods to help consumers easily identify them, making the first statement true. However, Vegan food under the regulations refers exclusively to foods that contain no ingredients, additives, or processing aids of animal origin, which excludes honey and dairy, making the second statement false.

148. (C) Canned carbonated energy drinks
The Food Safety and Standards (Foods for Infant Nutrition) Regulations strictly govern infant milk substitutes, infant formula, and processed cereal-based complementary foods to protect infant health. Canned carbonated energy drinks contain high caffeine and sugar levels, making them a negative exception that is regulated under standard beverage and additive rules instead.

149. (A) +F Logo – Fortified Foods
FSSAI uses standardized logos to identify specific food categories. The +F logo is the official certification mark used for fortified foods. Other logos are misaligned: the Jaivik Bharat logo is used for organic foods, the Radura logo represents irradiated foods, and the vegan logo identifies products free of animal-derived ingredients.

150. (D) Enhanced protection of infants from nutritional deficits and microbiological hazards.
Stringent regulations for infant formula and complementary foods ensure that these sensitive products meet rigorous safety and compositional standards. This regulatory oversight directly enhances the protection of infants from nutritional deficits and microbiological hazards, reducing health risks and securing optimum infant nutrition during critical stages of early childhood development.

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mandatory certifications for food products
(C) FSSAI and EIC - Banning domestic food business operators from exporting
(D) FSSAI and NABL - Recognition and notification of primary food testing laboratories

15. Which of the following is the MOST appropriate function of the Commissioner of Food Safety at the state level?
(A) To personally supervise and test every individual food sample collected by local officers.
(B) To draft national constitutional amendments for the central Food Safety and Standards Act.
(C) To determine and dictate the annual minimum support price for domestic farm commodities.
(D) To temporarily prohibit food sales in the state to protect public health.

16. The Spices Board of India was constituted by merging which of the following two entities?
(A) Turmeric Board and Pepper Promotion Council
(B) Ginger Directorate and Ministry of Commerce
(C) Cardamom Board and Spices Export Promotion Council
(D) Central Spice Research Station and Export Inspection Council

17. The following question consists of two statements, one labeled as 'Assertion (A)' and the other labeled as 'Reason (R)'. Select the correct answer using the codes given below:
Assertion (A): The Tea Board of India operates an e-auction system for the sale of tea.
Reason (R): The e-auction system aims to bring transparency and better price discovery for tea producers and buyers.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

18. Which of the following statements is correct regarding the Coffee Board of India's role in quality standards?
(A) The Board strictly bans the agricultural production of Robusta coffee in favor of Arabica beans.
(B) It mandates decaffeination and chemical caffeine extraction for all exported coffee shipments.
(C) It operates as an independent autonomous non-governmental body outside of any Union Ministry.
(D) It prescribes standard quality grades for Indian coffee in export trade.

19. Consider the following statements about the Bureau of Indian Standards (BIS):
1. It is a statutory body established under the BIS Act, 2016 (replacing the 1986 Act).
2. It grants the ISI mark, which is synonymous with quality certification in India.
3. BIS standards for food are always mandatory for all Food Business Operators.
4. BIS represents India in the International Organization for Standardization (ISO).

Which of the above statement(s) is/are correct?
(A) 1, 2, and 4
(B) 1, 3, and 4
(C) 2 and 3 only
(D) 1, 2, 3, and 4

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20. Which of the following is an incorrect statement regarding AGMARK certification?
(A) AGMARK is a quality certification mark employed on agricultural products in India.
(B) It is implemented and monitored by the Directorate of Marketing and Inspection.
(C) It is legally mandatory for all farmers selling raw produce in local village markets.
(D) The standards cover quality aspects based on detailed physical and chemical profiles.

21. Match the organizations in List I with their focus areas in List II and select the correct option:
List I: (Organizations)
P. NABL
Q. NABH
R. FSSAI
S. EIC
List II: (Focus Areas)
I. Pre-shipment export quality inspection
II. Accreditation of testing and calibration labs
III. Domestic food safety standards
IV. Accreditation of healthcare organizations
(A) P-II, Q-IV, R-III, S-I
(B) P-I, Q-II, R-III, S-IV
(C) P-IV, Q-II, R-I, S-III

7. All of the following statements about the National Accreditation Board for Testing and Calibration Laboratories (NABL) are true, EXCEPT:
(A) It operates as a constituent board of the Quality Council of India (QCI).
(B) It formulates binding food safety regulations for all street food vendors.
(C) It provides accreditation to testing laboratories according to ISO/IEC 17025.
(D) NABL accreditation enhances the global acceptance of analytical test results.

8. Examine the two statements given below and select the correct option:
Statement I: The National Accreditation Board for Hospitals (NABH) is solely responsible for certifying the clinical efficacy of allopathic medicines.
Statement II: FSSAI collaborates with hospitals under initiatives like the 'Eat Right Campus' to ensure food safety in hospital canteens, which aligns with NABH standards for patient safety.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

9. Which of the following best describes the effect of mandatory registration with the Marine Products Export Development Authority (MPEDA) for seafood processing plants?
(A) It entirely exempts registered processing plants from the domestic Food Safety and Standards Act.
(B) It allows seafood processors to completely bypass customs duties on imported cooling equipment.
(C) It shifts the administrative and regulatory burden from MPEDA to the state fisheries departments.
(D) It ensures compliance with international sanitary standards for export traceability.

10. A food exporter discovers that their shipment of basmati rice was rejected by an importing country due to high pesticide residues. To prevent future rejections, which body's export certification mechanism, established under the Export (Quality Control and Inspection) Act, 1963, should the exporter rigorously follow?
(A) Export Inspection Council (EIC)
(B) Food Safety and Standards Authority of India (FSSAI)
(C) Quality Council of India (QCI)
(D) State Food and Drug Administration (FDA)

11. Arrange the following regulatory milestones in chronological order of their enactment:
1. Essential Commodities Act
2. Prevention of Food Adulteration Act
3. Food Safety and Standards Act
4. Agricultural Produce (Grading and Marking) Act
(A) 4, 1, 2, 3
(B) 4, 2, 1, 3
(C) 2, 4, 1, 3
(D) 1, 4, 2, 3

12. An aggrieved consumer bought a sealed packet of flour that was found to be infested with insects. Under the Consumer Protection Act, what is the legal concept that holds the manufacturer liable for selling a defective and unsafe food product?
(A) Caveat Emptor
(B) Product Liability
(C) Absolute Privilege
(D) Restitution In Integrum

13. Which of the following best defines the primary limitation of the legacy Prevention of Food Adulteration (PFA) Act, 1954, which led to its replacement?
(A) It focused on policing adulteration rather than science-based preventive food safety.
(B) It completely lacked administrative provisions for imposing monetary penalties on violators.
(C) It restricted its jurisdiction exclusively to imported food products and foreign trade channels.
(D) It was managed entirely by the Ministry of Agriculture without inputs from health departments.

14. Which of the following pairs concerning the coordination between FSSAI and other national bodies is incorrectly matched?
(A) FSSAI and APEDA - Harmonization of domestic and export standards for organic food
(B) FSSAI and BIS - Elimination of overlapping

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consider when granting the 'Spice House Certificate'?
(A) The exporter's processing and packaging infrastructure.
(B) The political affiliations and public standing of the processing firm's board.
(C) The average domestic retail price of the commodities being distributed.
(D) The historical volume of spices imported by the trader over a five-year period.

46. Where is the headquarters of the Coffee Board of India located?
(A) Mumbai
(B) Chennai
(C) Bengaluru
(D) Hyderabad

47. The following question consists of two statements, one labeled as 'Assertion (A)' and the other labeled as 'Reason (R)'. Select the correct answer using the codes given below:
Assertion (A): The Bureau of Indian Standards (BIS) formulates standards for products, processes, and services in India.
Reason (R): BIS is an international body headquartered in Geneva that regulates global trade.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

48. Which of the following statements is correct regarding the AGMARK certification system?
(A) It provides comprehensive assurance regarding the biochemical and microbiological safety of marine seafood exports.
(B) It is administered directly by the executive wing of the Food Safety and Standards Authority of India.
(C) It is a quality-based grading scheme for agricultural commodities.
(D) It applies exclusively to highly processed and retail-packaged foods, completely ignoring raw agricultural grains.

49. Consider the following statements about NABL:
1. It is a constituent board of the Quality Council of India.
2. It assesses the technical competence of testing and calibration laboratories.
3. It has the authority to penalize Food Business Operators for non-compliance.
4. FSSAI recognizes NABL accreditation for its notified laboratories.

Which of the above statement(s) is/are correct?
(A) 1, 2, and 3
(B) 1, 2, and 4
(C) 2, 3, and 4
(D) 1, 3, and 4

50. Which of the following is an incorrect statement regarding the National Accreditation Board for Hospitals & Healthcare Providers (NABH)?
(A) NABH standards include protocols for infection control and patient safety.
(B) NABH evaluates the hospital's food services to ensure hygiene and dietary requirements are met.
(C) It is a constituent board of the Quality Council of India.
(D) NABH is a statutory body under the Ministry of Agriculture and Farmers Welfare.

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51. Match the Acts/Boards in List I with their primary regulatory focus in List II and select the correct option:
List I: (Acts/Boards)
P. Essential Commodities Act
Q. Spices Board
R. Consumer Protection Act
S. PFA Act, 1954
List II: (Regulatory Focus)
I. Legacy food adulteration control
II. Redressal of unfair trade practices
III. Control of production and distribution to prevent hoarding
IV. Export promotion of cardamom and pepper
(A) P-III, Q-IV, R-II, S-I
(B) P-IV, Q-III, R-I, S-II
(C) P-III, Q-II, R-IV, S-I
(D) P-I, Q-IV, R-II, S-III

52. All of the following are valid mechanisms for export certification by the Export Inspection Council (EIC), EXCEPT:
(A) Consignment-wise Inspection (CWI)
(B) In-process Quality Control (IPQC)
(C) Domestic Retail Audit (DRA)
(D) Self-Certification

53. Examine the two statements given below and select the correct option:

(D) P-II, Q-III, R-IV, S-I

22. All of the following are primary components of the National Accreditation Board for Hospitals & Healthcare Providers (NABH) standards that intersect with food safety, EXCEPT:
(A) Hygiene of hospital kitchens and dietary services.
(B) Nutritional assessment of patient meals.
(C) Management of food-borne outbreaks within the healthcare facility.
(D) Licensing of local street food vendors outside hospital premises.

23. Examine the two statements given below and select the correct option:
Statement I: The Marine Products Export Development Authority (MPEDA) provides financial assistance for upgrading seafood processing plants.
Statement II: MPEDA's mandate strictly prohibits it from participating in international seafood trade fairs.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

24. Which of the following best describes the effect of obtaining a Certificate of Inspection from the Export Inspection Council (EIC)?
(A) It guarantees complete exemption from all custom duties and tariff barriers in importing nations.
(B) It permanently replaces the legal requirement of holding a domestic FSSAI food business license.
(C) It certifies that the shipment meets specified export quality standards.
(D) It grants exporters a unilateral right to alter labeling declarations during transit.

25. A severe drought leads to a sudden shortage of onions, and traders begin hoarding them. Which law allows the government to impose stock limits to prevent hoarding and black-marketing of such food items?
(A) Food Safety and Standards Act, 2006
(B) Prevention of Food Adulteration Act, 1954
(C) Consumer Protection Act, 2019
(D) Essential Commodities Act, 1955

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26. Which of the following pairs regarding Consumer Dispute Redressal Commissions is correctly matched under the Consumer Protection Act, 2019?
(A) State Commission - Entertains complaints where the value is between Rs. 1 Crore and Rs. 10 Crores
(B) District Commission - Entertains complaints where the value of goods/services exceeds Rs. 10 Crores
(C) National Commission - Hears appeals only against the Supreme Court
(D) Central Consumer Protection Authority (CCPA) - Deals exclusively with corporate tax fraud

27. The transition from the Prevention of Food Adulteration (PFA) Act to the Food Safety and Standards Act marked a paradigm shift in Indian food regulation. Which concept best characterizes this shift?
(A) From voluntary enterprise self-compliance to mandatory absolute prohibition of imports.
(B) From reactive policing to proactive risk-based safety management.
(C) From scientific hazard analysis back to a multi-layered inspector-led policing regime.
(D) From unified central standard-setting to complete administrative state-level autonomy.

28. Which of the following best defines the purpose of coordination between FSSAI and bodies like APEDA and MPEDA?
(A) To deliberately complicate and slow down the export clearance process for small-scale food business operators.
(B) To align domestic safety regulations with export compliance standards to avoid dual testing.
(C) To structurally merge these autonomous agencies into one singular, all-powerful central Ministry of Food.
(D) To legally mandate that all rejected food shipments must be sent back to regional ports for testing.

29. Which of the following pairs concerning State Food Departments is incorrectly matched?
(A) Food Safety Officer (FSO) - Primarily

CHAPTER 28

National Regulatory and Promotional Bodies

1. Which of the following product categories is primarily promoted for export by the Agricultural and Processed Food Products Export Development Authority (APEDA)?
(A) Marine fishery and aquaculture products
(B) Scheduled agricultural products
(C) Essential heavy industrial chemicals
(D) Manufactured textiles and apparel

2. The following question consists of two statements, one labeled as 'Assertion (A)' and the other labeled as 'Reason (R)'. Select the correct answer using the codes given below:
Assertion (A): The Spices Board of India implements mandatory pre-shipment inspection for all spices exported from India.
Reason (R): The primary objective of the Spices Board is to ensure that sub-standard spices do not harm the international reputation of Indian exports.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

3. Which of the following statements is correct regarding the regulatory functions of the Tea Board of India?
(A) It issues mandatory licenses for tea exporters and regulates tea waste disposal.
(B) It has no role in the domestic marketing of tea, focusing exclusively on international trade.
(C) It standardizes the maximum retail price of tea for all retail outlets in India.
(D) It directly cultivates tea estates on behalf of private planters.

4. Consider the following statements regarding the Coffee Board of India:
1. It functions under the Ministry of Commerce and Industry.
2. It was established by the Coffee Act, 1942.
3. It guarantees the purchase of all privately grown coffee in India.
4. It conducts research and quality evaluation of coffee beans.

Which of the above statement(s) is/are correct?
(A) 2, 3, and 4
(B) 1 and 3 only
(C) 1, 2, and 4
(D) 1, 2, 3, and 4

5. Which of the following is an incorrect statement concerning the Bureau of Indian Standards (BIS)?
(A) The ISI mark is mandatory for all primary agricultural commodities.
(B) BIS operates under the Ministry of Consumer Affairs, Food and Public Distribution.
(C) BIS is responsible for formulating national quality standards for food.
(D) Certain products like packaged drinking water require mandatory certification.

6. Match the terms in List I with their descriptions in List II and select the correct option:
List I: (AGMARK parameters)
P. AGMARK Grading
Q. Directorate of Marketing & Inspection (DMI)
R. Agricultural Produce (Grading and Marking) Act
S. Central AGMARK Laboratory
List II: (Relevance)
I. Apex testing facility in Nagpur
II. Implementing agency for AGMARK
III. Enacted in the year 1937
IV. Based on physical and chemical parameters
(A) P-I, Q-II, R-IV, S-III
(B) P-IV, Q-III, R-II, S-I
(C) P-II, Q-IV, R-I, S-III
(D) P-IV, Q-II, R-III, S-I

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37. All of the following are primarily focused on promoting India's agricultural and marine exports, EXCEPT:
(A) NCDRC
(B) APEDA
(C) MPEDA
(D) EIC

38. Examine the two statements given below and select the correct option:
Statement I: The Export Inspection Council (EIC) is the official export certification body of India.
Statement II: The EIC certification guarantees that the exported products meet the requirements of the importing countries.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

39. Which of the following best describes the effect of invoking the Essential Commodities Act on a specific food item?
(A) The targeted food commodity is immediately declared unfit for human consumption due to safety risks.
(B) The government gains authority to regulate its pricing and distribution.
(C) The export of the specified item is heavily subsidized and promoted by central trade departments.
(D) All forms of private domestic and retail trade of the designated item are permanently abolished.

40. A consumer falls ill after consuming adulterated sweets from a local shop. Under the Consumer Protection Act, what immediate mechanism is available for the consumer to seek compensation?
(A) Filing a formal civil lawsuit in the Supreme Court of India directly.
(B) Lodging an official appeal with the central Export Inspection Council.
(C) Filing a complaint with the District Consumer Commission.
(D) Requesting a comprehensive forensic audit of AGMARK certification labels.

41. Arrange the following Consumer Disputes Redressal Commissions in hierarchical order from lowest to highest level of appeal:
1. National Commission (NCDRC)
2. District Commission
3. State Commission
(A) 1, 2, 3
(B) 2, 3, 1
(C) 3, 2, 1
(D) 2, 1, 3

42. How does the concept of "One Nation, One Food Law" reflect the coordination between FSSAI and other national bodies?
(A) By consolidating multiple legacy laws under the Food Safety and Standards Act.
(B) By deliberately allowing various agencies to issue contradictory quality and pricing standards.
(C) By completely replacing independent State Food Departments with a unified corps of Central officers.
(D) By delegating executive food inspection powers exclusively to the Bureau of Indian Standards.

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43. Which of the following best defines the role of the State Food Safety Commissioner?
(A) An administrative officer appointed by the Union Government tasked with monitoring food export quality.
(B) A state-appointed officer responsible for enforcing the FSS Act.
(C) A senior judicial officer presiding over the National Consumer Disputes Redressal Commission.
(D) An elected regional politician who serves as the active head of the agricultural marketing board.

44. Which of the following pairs is incorrectly matched regarding APEDA's mandate?
(A) Floriculture products - Included in APEDA's mandate
(B) Marine products - Included in APEDA's mandate
(C) Alcoholic beverages - Included in APEDA's mandate
(D) Cereal products - Included in APEDA's mandate

45. Which of the following is the MOST appropriate parameter for the Spices Board of India to

formulates national food safety laws
(B) Commissioner of Food Safety - Prohibits the sale of unsafe food in the state
(C) Designated Officer (DO) - Issues or cancels licenses of Food Business Operators in a district
(D) Food Analyst - Analyzes food samples sent by the Food Safety Officer

30. Which of the following is the MOST appropriate strategy for APEDA to enhance the export of Indian mangoes to regions with strict phytosanitary regulations like the EU and USA?
(A) Enacting a total ban on exporting any fresh mango varieties to high-risk zones.
(B) Submitting petitions to lower the nutritional and mineral index requirements of fruits.
(C) Establishing vapor heat treatment and irradiation facilities.
(D) Moving all developmental and marketing focus away from fruits to processed chocolate.

31. Where is the headquarters of the Tea Board of India located?
(A) Bengaluru
(B) Kochi
(C) Darjeeling
(D) Kolkata

32. The following question consists of two statements, one labeled as 'Assertion (A)' and the other labeled as 'Reason (R)'. Select the correct answer using the codes given below:
Assertion (A): The Coffee Board of India focuses extensively on research and development.
Reason (R): Enhancing coffee yield and improving disease resistance (like leaf rust) are critical for maintaining the competitiveness of Indian coffee.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

33. Which of the following statements is correct regarding the Bureau of Indian Standards (BIS) food product certification?
(A) BIS certification is voluntary for all food products without exception.
(B) Infant formula and food additives require mandatory BIS certification.
(C) BIS formulates standards only for non-food industrial products.
(D) BIS standards supersede the regulations laid down by FSSAI in case of conflict.

34. Consider the following statements regarding AGMARK:
1. It is backed by the Agricultural Produce (Grading and Marking) Act, 1937.
2. The grading is based solely on the packaging material used.
3. Blended edible vegetable oils require mandatory AGMARK certification.
4. The Central AGMARK Laboratory is located in Nagpur.

Which of the above statement(s) is/are correct?
(A) 1, 2, and 4
(B) 2 and 3 only
(C) 1, 2, 3, and 4
(D) 1, 3, and 4

35. Which of the following is an incorrect statement about the National Accreditation Board for Testing and Calibration Laboratories (NABL)?
(A) NABL establishes the maximum residue limits (MRLs) for pesticides in food.
(B) NABL is a mutual recognition arrangement (MRA) signatory to ILAC.
(C) Accreditation involves a formal recognition of the technical competence of a testing lab.
(D) FSSAI utilizes NABL-accredited laboratories for the regulatory testing of food samples.

36. Match the authorities in List I with their primary certifications or marks in List II and select the correct option:
List I: (Authorities)
P. BIS
Q. DMI
R. Spices Board
S. FSSAI
List II: (Certifications/Marks)
I. Spice House Certificate
II. FSSAI Logo / License Number
III. ISI Mark
IV. AGMARK
(A) P-I, Q-II, R-IV, S-III
(B) P-IV, Q-III, R-II, S-I
(C) P-II, Q-IV, R-I, S-III
(D) P-IV, Q-II, R-III, S-I

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Statement I: The Essential Commodities Act, 1955, allows the government to regulate the supply and pricing of specific food items during emergencies.
Statement II: The Act guarantees a fixed Minimum Support Price (MSP) for all agricultural products regardless of market conditions.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

54. Which of the following best describes the effect of the Consumer Protection Act, 2019, introducing the concept of "Product Liability"?
(A) It completely shields manufacturers from consumer compensation claims if a product is shown to be adulterated.
(B) It forces aggrieved consumers to prove criminal intent to harm before they can file any regulatory complaint.
(C) It limits monetary compensation rewards exclusively to verified clinical medical expenses that are incurred.
(D) It holds manufacturers and sellers liable for harm from defective products.

55. A historical analysis of the Prevention of Food Adulteration (PFA) Act, 1954, reveals its limitations in modern food trade. If a legacy food inspector primarily focused on visually inspecting for brick powder in chili powder, what modern paradigm was missing in this approach?
(A) An excessive reliance on highly subjective, non-empirical sensory evaluation by field inspectors.
(B) The absence of science-based hazard and risk assessment protocols.
(C) An administrative overemphasis on inspecting imported food materials at international sea ports.
(D) A systemic failure by regional state laboratories to apply and enforce the official AGMARK logo.

56. Which of the following pairs is correctly matched regarding the organizational structure of Food Safety?
(A) Food Analyst - Conducts inspection of food manufacturing premises
(B) Food Safety Officer - Conducts chemical analysis of food in laboratories
(C) Designated Officer - Sanctions fine-related prosecutions
(D) Commissioner of Food Safety - Drafts standards for ISO

57. Under the concept of regulatory coordination, how do State Food Departments primarily interact with FSSAI?
(A) By creating autonomous, parallel food safety standards that completely override FSSAI orders.
(B) By acting as primary collection agencies for national food taxes and import duties on behalf of FSSAI.
(C) By outsourcing core testing and enforcement functions to local, non-governmental consumer groups.
(D) By enforcing FSSAI regulations on the ground level.

58. Which of the following best defines the term "Scheduled Products" in the context of APEDA?
(A) Products listed in the APEDA Act scheduled for export promotion.
(B) Agricultural and manufacturing goods that are strictly banned for export by central trade ministries.
(C) Domestic commodities that are heavily monitored and regulated under the Essential Commodities Act.
(D) Highly processed dietary supplements that require mandatory clinical testing phase trials before retail sale.

59. Which of the following pairs concerning the Spices Board is incorrectly matched?
(A) Spices Board establishment year - 1987
(B) Nodal Ministry - Ministry of Health and Family Welfare
(C) Primary focus - Export promotion and quality control of spices
(D) Cardamom - A major spice under its direct developmental mandate

60. Which of the following is the MOST appropriate method employed by the Tea Board to ensure fair pricing and transparency in the domestic tea trade?
(A) Fixing a uniform flat rate for all tea leaves regardless of quality.

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(B) Implementing a pan-India electronic auction (e-auction) system.
(C) Banning the export of high-grade Darjeeling tea.
(D) Purchasing all tea produce directly through state-owned enterprises.

61. What is the standard mark issued by the Bureau of Indian Standards (BIS) for industrial and consumer goods, including some processed foods?
(A) ISI Mark
(B) AGMARK
(C) FPO Mark
(D) India Organic Mark

62. The following question consists of two statements, one labeled as 'Assertion (A)' and the other labeled as 'Reason (R)'. Select the correct answer using the codes given below:
Assertion (A): The AGMARK grade is often used as a benchmark for quality in agricultural commodities.
Reason (R): AGMARK standards are scientifically formulated based on intrinsic quality factors like moisture, free fatty acids, and adulterants.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

63. Which of the following statements is correct regarding the National Accreditation Board for Testing and Calibration Laboratories (NABL)?
(A) NABL accreditation is exclusively for government-owned laboratories.
(B) NABL operates under the Department for Promotion of Industry and Internal Trade (DPIIT).
(C) NABL directly tests food samples and issues safety certificates to consumers.
(D) NABL uses the standard ISO/IEC 17025 for assessing testing laboratories.

64. Consider the following statements about NABH (National Accreditation Board for Hospitals):
1. It is responsible for accrediting healthcare organizations in India.
2. It sets guidelines that include the management of food and dietetics services in hospitals.
3. It legally prosecutes food adulterators caught within hospital premises.
4. It operates under the Quality Council of India (QCI).

Which of the above statement(s) is/are correct?
(A) 2, 3, and 4
(B) 1 and 3 only
(C) 1, 2, and 4
(D) 1, 2, 3, and 4

65. Which of the following is an incorrect statement regarding the Marine Products Export Development Authority (MPEDA)?
(A) MPEDA is headquartered in Kochi, Kerala.
(B) It prohibits exporting value-added seafood.
(C) It functions under the Ministry of Commerce and Industry.
(D) It provides technical assistance for aquaculture and seafood processing.

66. Match the bodies in List I with their parent Ministries/Organizations in List II and select the correct option:
List I: (Bodies)
P. EIC
Q. APEDA
R. BIS
S. NABL
List II: (Ministries/Organizations)
I. Quality Council of India
II. Ministry of Consumer Affairs, Food & Public Distribution
III. Ministry of Commerce & Industry
IV. Ministry of Commerce & Industry (Statutory Body for Ag-exports)
(A) P-IV, Q-III, R-I, S-II
(B) P-III, Q-I, R-II, S-IV
(C) P-II, Q-IV, R-III, S-I
(D) P-III, Q-IV, R-II, S-I

67. Under the Essential Commodities Act, the government can regulate all of the following aspects of a declared essential commodity, EXCEPT:
(A) Consumer dietary preferences
(B) Maximum Retail Price (MRP)
(C) The legal stock limits for wholesalers
(D) Distribution channels

68. Examine the two statements given below and select the correct option:
Statement I: The Consumer Protection Act, 2019, established the Central Consumer Protection

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Authority (CCPA) to promote, protect, and enforce consumer rights.
Statement II: The CCPA has the power to issue directions to recall goods that are dangerous, hazardous, or unsafe.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

69. Which of the following best describes the effect of replacing the legacy Prevention of Food Adulteration (PFA) Act with the FSS Act, 2006?
(A) It consolidated multiple orders (like FPO, MMPO, MFPO) into a single regulatory framework.
(B) It decentralized standard-setting to individual states, causing non-uniformity.
(C) It removed the requirement for food labeling entirely.
(D) It shifted the primary regulatory authority from the Ministry of Health to the Ministry of Agriculture.

70. A Food Safety Officer (FSO) finds a local dairy operating without a license and producing substandard paneer. Under the current regulatory framework coordinated by FSSAI, what action should the FSO take?
(A) Directly arrest the dairy operator without any warrant under legacy provisions of the PFA Act.
(B) Formally request the NABL or QCI to immediately cancel the dairy's commercial ISI mark.
(C) Report the licensing non-compliance directly to the Spices Board for high penal action.
(D) Seize samples and issue an improvement notice under the FSS Act.

71. Arrange the following steps in the typical regulatory action process by a State Food Department:
1. Sending the sample to the Food Analyst
2. Inspection of the premises by the Food Safety Officer (FSO)
3. Report submission by the Food Analyst to the Designated Officer (DO)
4. Lifting of suspected food samples by the FSO

(A) 2, 4, 1, 3
(B) 2, 1, 4, 3
(C) 4, 2, 1, 3
(D) 2, 4, 3, 1

72. If a food product holds an organic certification endorsed by APEDA under the National Programme for Organic Production (NPOP), how does this concept interface with FSSAI regulations for domestic sale?
(A) The certified organic product is legally restricted to export markets and cannot be sold domestically.
(B) FSSAI mandates that the organic product undergo complete re-certification by the Bureau of Indian Standards.
(C) FSSAI recognizes NPOP certification for domestic sale.
(D) The food product must be completely stripped of its organic labeling before entering domestic retail chains.

73. Which of the following best defines the 'Spice House Certificate' awarded by the Spices Board?
(A) A mandatory agricultural license required for farmers to legally cultivate various spices in India.
(B) A special customs tariff and tax clearance document required for importing international spices.
(C) A protected Geographical Indication (GI) intellectual property tag issued for generic domestic spices.
(D) Recognition for exporters with high-quality processing infrastructure.

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74. Which of the following pairs concerning the Tea Board of India is incorrectly matched?
(A) Head Office - Darjeeling
(B) Tea Board establishment - Tea Act, 1953
(C) Major function - Promoting the cultivation, processing, and domestic/international trade of tea
(D) Special mechanism - E-auction system for tea

75. Which of the following is the MOST appropriate objective of the Coffee Board's quality evaluation standards?
(A) To chemically maximize the total caffeine content across all exported coffee shipments.
(B) To ensure exports meet international cup

transport export commodities from domestic warehouses to foreign shipping docks.

137. The following question consists of two statements, one labeled as 'Assertion (A)' and the other labeled as 'Reason (R)'. Select the correct answer using the codes given below:
Assertion (A): The Essential Commodities Act allows the government to regulate the trade and commerce of certain foodstuffs.
Reason (R): The primary objective of the ECA is to ensure the equitable distribution and availability of essential items at fair prices, especially during shortages.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

138. Which of the following statements is correct regarding the redressal mechanisms under the Consumer Protection Act?
(A) Consumers can file complaints directly without mandatory legal representation.
(B) Consumers are legally restricted to filing complaints through registered lawyers, and personal appearance is banned.
(C) All official orders passed by the District Commission are final and cannot be appealed in any state or national forum.
(D) Consumer tribunals and forums are completely barred from entertaining or acting on any food-related complaints.

139. Consider the following statements about the legacy Prevention of Food Adulteration (PFA) Act:
1. It was enacted in the year 1954.
2. It was heavily focused on penalizing end-product adulteration.
3. It required a multi-tiered, complex licensing system managed by different ministries.
4. It fully integrated international Codex standards natively.

Which of the above statement(s) is/are correct?
(A) 1, 2, and 4
(B) 1, 2, and 3
(C) 2, 3, and 4
(D) 1, 3, and 4

140. Which of the following is an incorrect statement regarding the coordination between FSSAI and State Food Departments?
(A) State Food Departments are responsible for the enforcement of the FSS Act on the ground.
(B) State Food Departments can permanently override FSSAI rules.
(C) FSSAI formulates the regulations, and State Commissioners execute them.
(D) FSSAI provides capacity building and training to State Food Safety Officers.

141. Match the State Food Department officials in List I with their primary functions under the FSS Act in List II and select the correct option:
List I: (Officials)
P. Commissioner of Food Safety
Q. Designated Officer (DO)
R. Food Safety Officer (FSO)
S. Food Analyst
List II: (Primary Functions)
I. Inspects premises and lifts samples
II. Analyzes samples and issues reports
III. Oversees the district, issues licenses, sanctions prosecutions
IV. Heads the state enforcement mechanism
(A) P-IV, Q-III, R-I, S-II
(B) P-III, Q-IV, R-II, S-I
(C) P-IV, Q-I, R-III, S-II
(D) P-I, Q-II, R-IV, S-III

142. All of the following products fall under the export promotion mandate of APEDA, EXCEPT:
(A) Meat and meat products
(B) Jaggery and sugar products
(C) Unprocessed marine fish
(D) Cocoa and its products

143. Examine the two statements given below and select the correct option:
Statement I: The Spices Board of India issues the Spice House Certificate as a mandatory requirement for every domestic retail spice seller.
Statement II: The Spices Board heavily promotes the export of value-added spices like spice oils and oleoresins.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.

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trade practices.
(D) The right to arrest a retailer without police intervention.

83. Examine the two statements given below and select the correct option:
Statement I: The Prevention of Food Adulteration (PFA) Act, 1954, heavily relied on continuous inspection and punishment.
Statement II: The FSS Act, 2006, shifted the focus to self-compliance, scientific risk assessment, and capacity building.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

84. Which of the following best describes the effect of FSSAI establishing a formal coordination mechanism with Customs authorities (like ICEGATE integration)?
(A) It drastically slows down and complicates the administrative clearance of all safe biological food imports.
(B) It completely eliminates the physical necessity of laboratory testing and chemical assaying for imported goods.
(C) It enables paperless and risk-based import clearance, reducing transit time.
(D) It transfers executive authority and mandate over domestic consumer food safety directly to the Customs Department.

85. A State Food Department receives intelligence about widespread adulteration of milk during a festival. Which official has the immediate statutory power to prohibit the sale of such milk in the entire district in the interest of public health?
(A) Designated Officer
(B) Food Analyst
(C) Commissioner of Food Safety
(D) Food Safety Officer

86. Which of the following pairs is correctly matched regarding APEDA's activities?
(A) Scheduled Products - Excludes all agricultural commodities
(B) HortiNet - An online system for marine exports
(C) APEDA Head Office - Chennai
(D) NPOP - National Programme for Organic Production

87. How does the concept of "Quality Grading" by the Spices Board facilitate international trade?
(A) By assigning quality and trade grades based exclusively on the volumetric dimension of the shipping cardboard container.
(B) By establishing recognized quality standards that remove the need for pre-purchase physical inspection.
(C) By legally forcing all authorized exporters to distribute spice commodities at a single, rigid, board-mandated price level.
(D) By restrictionally limiting national outbound trade channels to only one highly processed grade of agricultural spice.

88. Which of the following best defines the role of the Tea Board in the quality grading of tea?
(A) It legally dictates that only standard low-grade CTC (Crush, Tear, Curl) tea varieties are permitted to be exported.
(B) It operates regional sorting plants to physically sort all tea leaves manufactured in the country at a central hub.
(C) It supports the industry in maintaining standards like Darjeeling Tea GI specifications.
(D) It strictly prohibits any industrial grading of loose tea, actively promoting unsorted bulk commodity sales.

89. Which of the following pairs concerning the Coffee Board of India is incorrectly matched?
(A) Statutory Act - Coffee Act, 1942
(B) Headquarters - Bengaluru
(C) Primary coffee varieties promoted - Arabica and Robusta
(D) Certification - Issues mandatory ISI marks for coffee

90. Which of the following is the MOST appropriate reason for a food manufacturer to obtain a voluntary BIS certification (ISI mark) for a product that does not legally require it?
(A) To gain a competitive advantage by demonstrating verified product quality.
(B) To obtain permanent regulatory exemptions that allow the plant to bypass mandatory local FSSAI inspections.

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quality standards.
(C) To strictly prohibit any physical mixing of chicory with coffee beans in domestic formulations.
(D) To legally enforce the addition of synthetic aromatic compounds and artificial flavorings in exports.

76. The Agricultural Marketing (Grading and Marking) Act, which governs AGMARK, was enacted in which year?
(A) 1954
(B) 1937
(C) 1986
(D) 2006

77. The following question consists of two statements, one labeled as 'Assertion (A)' and the other labeled as 'Reason (R)'. Select the correct answer using the codes given below:
Assertion (A): NABL accreditation is highly sought after by food testing laboratories in India.
Reason (R): FSSAI regulations mandate that primary food testing laboratories must be NABL accredited to be notified by the Authority.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

78. Which of the following statements is correct regarding the National Accreditation Board for Hospitals (NABH)?
(A) NABH directly issues food safety licenses to hospital kitchens, completely superseding FSSAI regulations.
(B) NABH operates as a global international safety agency directly affiliated with the World Health Organization.
(C) It evaluates hospital biomedical and food waste disposal protocols.
(D) All forms of dietary and food service hygiene are kept entirely outside the purview of formal NABH reviews.

79. Consider the following statements regarding the Marine Products Export Development Authority (MPEDA):
1. It handles the export promotion of all marine products, including fish and shrimp.
2. It operates a catch certificate scheme to combat illegal, unreported, and unregulated (IUU) fishing.
3. It sets the domestic maximum retail price for freshwater fish.
4. It implements schemes to modernize seafood processing infrastructure.

Which of the above statement(s) is/are correct?
(A) 1, 3, and 4
(B) 2, 3, and 4
(C) 1, 2, 3, and 4
(D) 1, 2, and 4

80. Which of the following is an incorrect statement regarding the Export Inspection Council (EIC)?
(A) EIC was established under the statutory provisions of the Export (Quality Control and Inspection) Act of 1963.
(B) EIC provides assurance on quality and safety through various inspection systems.
(C) EIC certification is mandatory for every export regardless of destination rules.
(D) EIC is an advisory body to the Central Government on export quality control.

81. Match the provisions in List I with their respective Acts in List II and select the correct option:
List I: (Provisions)
P. Control of production, supply, and distribution
Q. Protection against unfair trade practices
R. Prevention of food adulteration (Legacy)
S. Modern risk-based food safety standards
List II: (Acts)
I. Consumer Protection Act
II. FSS Act, 2006
III. Essential Commodities Act
IV. PFA Act, 1954
(A) P-I, Q-III, R-II, S-IV
(B) P-III, Q-I, R-IV, S-II
(C) P-IV, Q-II, R-III, S-I
(D) P-III, Q-IV, R-I, S-II

82. Under the Consumer Protection Act, 2019, a consumer has all of the following rights, EXCEPT:
(A) The right to be protected against the marketing of goods that are hazardous to life and property.
(B) The right to be informed about the quality, quantity, potency, purity, standard, and price of goods.
(C) The right to seek redressal against unfair

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Statement II: In case of any conflict in food standards, the standards formulated by BIS strictly override FSSAI regulations.

(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

99. Which of the following best describes the effect of a Designated Officer (DO) suspending the license of a Food Business Operator (FBO)?

(A) The FBO must immediately cease all licensed operations.
(B) The FBO is permitted to continue normal retail operations but must pay a compounding daily penalty.
(C) The individual FBO is permanently and unconditionally blacklisted from launching any enterprise in India.
(D) The regional State Food Department directly takes over and coordinates the daily operations of the plant.

100. An exporter wishes to export honey to Europe. Which body's Tracenet system is utilized to ensure the traceability of the organic honey export?

(A) MPEDA
(B) Spices Board
(C) APEDA
(D) EIC

101. Arrange the following steps in the export certification process of spices by the Spices Board:

1. Issuance of analytical report and clearance
2. Registration of the exporter with the Spices Board
3. Drawing of samples from the consignment by Board officials
4. Intimation of the export consignment details by the exporter

(A) 2, 4, 3, 1
(B) 2, 3, 4, 1
(C) 4, 2, 3, 1
(D) 1, 2, 4, 3

102. Under the concept of quality grading, the Tea Board's regulations ensure that Darjeeling Tea maintains its unique characteristics. This is legally protected internationally under which intellectual property framework?

(A) International Copyright laws
(B) Industrial Utility Patents
(C) Standard Registered Trademark alone
(D) Geographical Indication

103. Which of the following best defines the function of the Coffee Board regarding the "cupping" of coffee?

(A) It refers to the industrial manufacturing and styling of specialized ceramic coffee cups and consumer mugs.
(B) It is a sensory evaluation process to assess coffee quality.
(C) It refers to the manual farming method of physically harvesting ripe coffee cherries using standardized collection cups.
(D) It is an advanced analytical laboratory test used to determine the concentration of pesticide residues in beans.

104. Which of the following pairs concerning the Bureau of Indian Standards (BIS) is incorrectly matched?

(A) BIS Act - 2016
(B) Mandatory Certification - Infant Milk Substitutes
(C) Nodal Ministry - Ministry of Health
(D) Standard Mark - ISI Mark

105. Which of the following is the MOST appropriate commodity for AGMARK certification?

(A) Mobile phones
(B) Intravenous fluids
(C) Synthetic polyester yarn
(D) Mustard oil

106. Which of the following is an essential requirement for a hospital dietary department seeking NABH accreditation?

(A) It must maintain statutory FSSAI compliance.
(B) It is legally required to serve exclusively organic vegetarian food formulations to all patients.
(C) It must import high-grade raw food ingredients exclusively from accredited global international vendors.
(D) It is required to completely outsource its dietary kitchen operations to an external fast-food chain.

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107. The following question consists of two statements, one labeled as 'Assertion (A)' and the other labeled as 'Reason (R)'. Select the correct answer using the codes given below:
Assertion (A): MPEDA has the authority to inspect marine products, their raw materials, and processing plants.
Reason (R): MPEDA aims to ensure that marine products destined for export comply with the stringent sanitary and phytosanitary (SPS) measures of importing countries.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

108. Which of the following statements is correct regarding the Export Inspection Council (EIC) certification?
(A) It is formulated solely based on subjective, post-shipment quality feedback submitted by the international buyer.
(B) It can involve continuous In-Process Quality Control monitoring.
(C) It completely and permanently exempts registered food exporters from declaring any nutritional value on product labels.
(D) EIC functions as an autonomous, non-statutory body directly operating under the Union Ministry of External Affairs.

109. Consider the following statements regarding the Essential Commodities Act (ECA):
1. It aims to protect consumers from unreasonable price hikes of essential goods.
2. The government can impose stock-holding limits on retailers and wholesalers.
3. Confiscation of hoarded goods is a penalty provided under the Act.
4. It only applies to non-agricultural products.
Which of the above statement(s) is/are correct?
(A) 1, 2, and 3
(B) 1, 3, and 4
(C) 2, 3, and 4
(D) 1, 2, 3, and 4

110. Which of the following is an incorrect statement regarding the Central Consumer Protection Authority (CCPA)?
(A) It can conduct investigations into violations of consumer rights.
(B) It has the power to order the recall of unsafe food products.
(C) It operates under the Ministry of Commerce and Industry.
(D) It can impose penalties for misleading advertisements.

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111. Match the regulatory regimes in List I with their primary characteristics in List II and select the correct option:
List I: (Regulatory Regimes)
P. Prevention of Food Adulteration Act, 1954
Q. Food Safety and Standards Act, 2006
R. BIS Act
S. Essential Commodities Act
List II: (Characteristics)
I. Price and supply control
II. Product standardisation and ISI mark
III. Science-based, holistic food safety
IV. Adulteration control with heavy reliance on prosecution
(A) P-III, Q-IV, R-I, S-II
(B) P-IV, Q-I, R-II, S-III
(C) P-I, Q-III, R-IV, S-II
(D) P-IV, Q-III, R-II, S-I

112. All of the following highlight the coordination between FSSAI and other national bodies, EXCEPT:
(A) FSSAI recognizing NABL-accredited labs for primary testing.
(B) FSSAI harmonizing its standards with AGMARK for agricultural produce.
(C) FSSAI delegating enforcement permanently to state police.
(D) FSSAI participating in joint inspections with EIC for export-oriented units.

113. Examine the two statements given below and select the correct option:
Statement I: The Food Safety Officer (FSO) is the lowest level enforcement officer in the State Food Department hierarchy under the FSS Act.
Statement II: The FSO has the power to seize adulterated food articles and draw samples for analysis.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is

correct.

114. Which of the following best describes the effect of APEDA's financial assistance schemes on the food export industry?
(A) They cause an industry-wide decrease in the quality and safety of exported goods due to an over-reliance on direct state subsidies.
(B) They legally force authorized private exporters to sell their agricultural yields exclusively to central government trade agencies.
(C) They set tight administrative ceilings to intentionally restrict the total volume of agricultural items exported annually.
(D) They enable exporters to upgrade infrastructure and improve packaging to boost competitiveness.

115. A batch of export-bound Indian spices is suspected of containing Sudan dye (an illegal colorant). Which authority will immediately intervene and test the samples prior to shipment to ensure compliance with importing countries' regulations?
(A) Spices Board
(B) Food Safety and Standards Authority of India (FSSAI)
(C) NABH
(D) State Police

116. Which of the following pairs is correctly matched regarding the Tea Board's activities?
(A) Tea Board formation - 1986
(B) E-auction - A manual pricing mechanism conducted solely through written postal bids
(C) Promotional activity - Financial aid for tea garden replantation
(D) Headquarters - New Delhi

117. How does the concept of "Geographical Indication (GI)" relate to the Coffee Board's promotional activities?
(A) It protects regional coffees like 'Monsooned Malabar' to command premium prices.
(B) It legally guarantees a highly standardized, uniform minimum wage and welfare package for coffee plantation laborers globally.
(C) It is a simple administrative marker used solely to indicate the geographic location of the Coffee Board's headquarters.
(D) It strictly prohibits domestic retailers from selling special regional coffee blends anywhere outside their home state limits.

118. Which of the following best defines the "ISI Mark" relevance to processed food products?
(A) It acts as a mandatory custom declaration indicating that the processed product is filled with imported raw ingredients.
(B) It functions as a statutory green dot logo that officially denotes that the final processed food is 100% vegetarian.
(C) It is an universally recognized international quality mark accepted globally in place of the Codex Alimentarius codes.
(D) It certifies that the product meets the Indian Standard set by BIS.

119. Which of the following pairs concerning AGMARK is incorrectly matched?
(A) Implementing Agency - Directorate of Marketing and Inspection (DMI)
(B) Scope of AGMARK - Strictly limited to marine and fishery products
(C) Apex Laboratory - Central AGMARK Laboratory, Nagpur
(D) Legal backing - Agricultural Produce (Grading and Marking) Act, 1937

120. Which of the following is the MOST appropriate indicator of a food testing laboratory's technical competence and reliability in India?
(A) Having a large marketing budget.
(B) Being located in the national capital.
(C) Being accredited by NABL as per ISO/IEC 17025.
(D) Having a medical license from the Medical Council of India.

121. The Marine Products Export Development Authority (MPEDA) functions under the administrative control of which Ministry?
(A) Ministry of Agriculture and Farmers Welfare
(B) Ministry of Fisheries, Animal Husbandry and Dairying
(C) Ministry of Earth Sciences
(D) Ministry of Commerce and Industry

122. The following question consists of two statements, one labeled as 'Assertion (A)' and the other labeled as 'Reason (R)'. Select the correct answer using the codes given below:
Assertion (A): The Export Inspection Council (EIC) can grant self-certification status to certain exporters.

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(C) To legally qualify the manufacturing plant for complete exemptions from regional and national corporate income taxes.
(D) To deliberately reduce the baseline nutritional content and ingredient profile of the certified food product.

91. What is the standard (norm) used by NABL to accredit testing and calibration laboratories?
(A) ISO 9001 for quality management systems
(B) ISO/IEC 17025
(C) ISO 22000 for food safety management
(D) ISO 14001 for environmental management

92. The following question consists of two statements, one labeled as 'Assertion (A)' and the other labeled as 'Reason (R)'. Select the correct answer using the codes given below:
Assertion (A): Hospitals seeking NABH accreditation must ensure their dietary services meet strict food safety and hygiene protocols.
Reason (R): Compromised food safety in hospital settings can lead to severe nosocomial (hospital-acquired) infections or complications in vulnerable patients.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

93. Which of the following statements is correct regarding the Marine Products Export Development Authority (MPEDA)?
(A) It implements traceability programs from catch to export.
(B) It operates exclusively within the state of Kerala.
(C) It formulates the nutritional guidelines for school mid-day meals.
(D) It is an NGO funded by international marine conservation bodies.

94. Consider the following statements about the Export Inspection Council (EIC):
1. It is the official export certification body of India.
2. It was established under the Export (Quality Control and Inspection) Act, 1963.
3. EIC certificates are recognized by several countries globally, facilitating easier market access.
4. EIC provides testing facilities for food and agricultural products.

Which of the above statement(s) is/are correct?
(A) 1, 2, and 3
(B) 2, 3, and 4
(C) 1, 2, 3, and 4
(D) 1, 3, and 4

95. Which of the following is an incorrect statement regarding the Essential Commodities Act (ECA)?
(A) The central government can add or remove commodities from the schedule of the Act.
(B) The Act aims to maintain or increase the supply of essential commodities.
(C) Foodstuffs, including edible oilseeds and oils, can be regulated under this Act.
(D) Declared commodities can never be removed from the schedule.

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96. Match the Consumer Protection Forums in List I with their respective pecuniary jurisdictions in List II and select the correct option:
List I: (Forums)
P. District Commission
Q. State Commission
R. National Commission
List II: (Pecuniary Jurisdictions)
I. Exceeds Rs. 2 Crores
II. Upto Rs. 50 Lakhs
III. Between Rs. 50 Lakhs and Rs. 2 Crores
(A) P-I, Q-II, R-III
(B) P-III, Q-I, R-II
(C) P-II, Q-III, R-I
(D) P-II, Q-I, R-III

97. All of the following were major drawbacks of the legacy Prevention of Food Adulteration (PFA) Act, EXCEPT:
(A) Multiplicity of food laws and standard-setting bodies.
(B) Rigorous, science-based risk analysis and assessment.
(C) Heavy focus on adulteration rather than holistic food safety.
(D) Lack of a centralized, single-point regulatory authority.

98. Examine the two statements given below and select the correct option:
Statement I: FSSAI coordinates with BIS to align food standards and reduce dual certification burdens on the food industry.

129. Which of the following best describes the effect of the Spices Board's mandatory quality testing on Indian exports?
(A) It severely restricts the outbound volume of spices, causing structural damage to regional farming economies.
(B) It reduces import-rejection rates, protecting the global brand of Indian spices.
(C) It systemically shifts and increases the physical adulteration of lower-grade spices into the domestic retail market.
(D) It legally transfers the ultimate land ownership of all private spice plantations directly to central ministries.

130. A consignment of tea is destined for an international buyer who demands specific grading standards (e.g., Orange Pekoe). Which Indian statutory body's guidelines and promotional frameworks ensure the integrity of this grading system?
(A) Bureau of Indian Standards
(B) Food Corporation of India
(C) Spices Board of India
(D) Tea Board of India

131. Arrange the following coffee grades typically established by the Coffee Board in descending order of perceived premium quality:
1. Plantation A (Washed Arabica)
2. Arabica Cherry (Unwashed Arabica)
3. Robusta Cherry (Unwashed Robusta)
(A) 1, 2, 3
(B) 3, 2, 1
(C) 2, 1, 3
(D) 1, 3, 2

132. How does the concept of "Mandatory Certification" by BIS differ from "Voluntary Certification"?
(A) Mandatory certification strictly forbids using the physical ISI mark, which is reserved exclusively for optional consumer products.
(B) Voluntary quality certification is designed and administered as a regulatory tool strictly for imported foreign merchandise.
(C) Government mandates that the product cannot be sold without the ISI mark due to public safety.
(D) All forms of mandatory industrial certification are fully administered by FSSAI inspectors rather than standard BIS personnel.

133. Which of the following best defines the scope of AGMARK grading?
(A) It certifies agricultural commodities based on purity and physicochemical traits.
(B) It applies exclusively to highly processed, chemically synthesized, and artificial laboratory-grown dietary formulations.
(C) It is a protected global mark that legally guarantees that the retail food package has been imported from outside India.
(D) It is an official real estate land-grading framework used solely for calculating the market value of rural farms.

134. Which of the following pairs concerning NABL is incorrectly matched?
(A) NABL Full Form - National Accreditation Board for Testing and Calibration Laboratories
(B) Scope - Includes accreditation of Medical, Testing, and Calibration labs
(C) Affiliation - Constituent board of the Quality Council of India
(D) Regulatory Power - Issues licenses to operate food manufacturing plants

135. Which of the following is the MOST appropriate reason FSSAI emphasizes food safety within healthcare institutions accredited by NABH?
(A) To generate significant local licensing revenue and levy heavy administrative penalties in hospital dining rooms.
(B) To protect vulnerable patients with compromised immunity from foodborne infections.
(C) To statutory mandate that all clinical healthcare facilities serve only highly processed commercial food products.
(D) To administratively shift the entire operational burden of clinical food treatment onto local sanitary inspectors.

136. What is the primary focus of the Export Inspection Council (EIC) regarding food exports?
(A) To aggressively maximize the total fiscal collection of export tariffs and customs duties on outgoing items.
(B) To actively promote local domestic tourism by financing and organizing large international culinary exhibitions.
(C) To ensure products meet the standards of importing countries.
(D) To operate cargo fleets to physically

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Reason (R): Exporters who have demonstrated robust in-house quality management systems are trusted to self-certify their shipments, reducing regulatory bottlenecks.

(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

123. Which of the following statements is correct regarding the Essential Commodities Act (ECA) during a national crisis?

(A) The entire statutory framework of the ECA is automatically declared completely invalid during a national security crisis.
(B) The government can use it to control distribution and prices of vital foods.
(C) The Act permanently transfers executive price-setting powers and stock oversight directly to private supermarket giants.
(D) The Act legally mandates that regional farm operators must immediately export their entire agricultural crop surplus.

124. Consider the following statements regarding the Consumer Protection Act, 2019:

1. It includes e-commerce platforms under its regulatory ambit.
2. It allows consumers to file complaints electronically.
3. It limits product liability solely to the retail seller, exempting the manufacturer.
4. It provides for mediation as an alternate dispute resolution mechanism.

Which of the above statement(s) is/are correct?

(A) 1, 3, and 4
(B) 1, 2, and 4
(C) 2, 3, and 4
(D) 1, 2, 3, and 4

125. Which of the following is an incorrect statement regarding the legacy Prevention of Food Adulteration (PFA) Act?

(A) It heavily emphasized the principle of "safe food by design" and self-regulation.
(B) It lacked an integrated approach, operating in silos alongside FPO, MMPO, etc.
(C) It was repealed by the Food Safety and Standards Act, 2006.
(D) Penalties under PFA were mostly restricted to fines and imprisonment based on adulteration severity.

126. Match the coordination functions in List I with the respective pairs of bodies in List II and select the correct option:

List I: (Coordination Functions)
P. Alignment of organic food export and domestic standards
Q. Rationalization of mandatory product certification marks
R. Accreditation of food testing capabilities
S. Pre-shipment quality clearance for specific food exports

List II: (Bodies)
I. FSSAI & BIS
II. FSSAI & EIC
III. FSSAI & NABL
IV. FSSAI & APEDA

(A) P-I, Q-IV, R-II, S-III
(B) P-IV, Q-II, R-I, S-III
(C) P-IV, Q-I, R-III, S-II
(D) P-III, Q-I, R-IV, S-II

127. All of the following are statutory roles of a Designated Officer (DO) in a State Food Department, EXCEPT:

(A) Issuing and cancelling licenses of food business operators.
(B) Prohibiting the sale of any article of food in the district.
(C) Receiving reports and samples from Food Safety Officers.
(D) Drafting national food security laws.

128. Examine the two statements given below and select the correct option:

Statement I: APEDA is mandated with the responsibility of export promotion and development of scheduled products such as fruits, vegetables, and their products.

Statement II: APEDA determines the domestic minimum support price (MSP) for all scheduled agricultural products.

(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

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(D) Statement I is incorrect and Statement II is correct.

144. Which of the following best describes the effect of the Tea Board's regulations on tea waste?
(A) It actively encourages commercial mixing of processed tea waste with fresh leaves to lower retail consumer prices.
(B) It mandates that all accumulated raw tea waste must be packaged and exported as a premium gourmet tea variety.
(C) It controls disposal to prevent tea waste from being used as an adulterant.
(D) It enforces an immediate shutdown of tea production operations if any volume of organic leaf waste is generated.

145. A coffee exporter wants to ship 'Monsooned Malabar' to Italy. Which Indian body is responsible for providing the necessary quality specifications, promotional support, and market intelligence for this specific coffee variety?
(A) FSSAI
(B) Coffee Board of India
(C) APEDA
(D) Spices Board of India

146. Which of the following pairs is correctly matched regarding the Bureau of Indian Standards?
(A) BIS headquarters - Mumbai
(B) BIS Act 2016 - A legislative amendment that completely abolished the concept of standardization
(C) Hallmark - Certification for agricultural produce
(D) ISI Mark - Certification mark for industrial and food products

147. How does the concept of AGMARK differ primarily from FSSAI licensing?
(A) FSSAI enforces safety baselines, while AGMARK grades quality traits.
(B) FSSAI licensing is completely voluntary for small retail businesses, whereas AGMARK remains mandatory for all operators.
(C) FSSAI functions under the Union Ministry of Agriculture, while the AGMARK scheme is managed directly by the Ministry of Health.
(D) AGMARK is used to evaluate industrial processing machinery, while FSSAI evaluates the safety of final food products.

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148. Which of the following best defines "Accreditation" in the context of NABL?
(A) The process of issuing a health trade license to a restaurant.
(B) The chemical process of preserving food samples.
(C) Formal recognition of a laboratory's technical competence to perform tests.
(D) The legal prosecution of a food adulterator in court.

149. Which of the following pairs concerning NABH is incorrectly matched?
(A) Standard-setting authority - Dictates retail prices of surgical tools
(B) Focus area - Healthcare quality and patient safety
(C) Parent body - Quality Council of India
(D) Intersection with food safety - Assessment of hospital dietary kitchen services and hygiene

150. Which of the following is the MOST appropriate overarching goal of the Marine Products Export Development Authority (MPEDA)?
(A) To legally restrict and monitor the traditional fishing activities of indigenous coastal communities.
(B) To directly coordinate and manage the active naval defense operations of India's maritime borders.
(C) To solely encourage and promote the import of exotic and non-native marine species into Indian waters.
(D) To promote and develop the marine products export industry.

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38. (A) Both Statement I and Statement II are correct.
The Export Inspection Council is the official statutory body established by the government to oversee export quality control. Its rigorous certification procedures provide formal assurance that outward-bound shipments comply with safety parameters, ensuring that exported food and agricultural products satisfy the specific quality and regulatory requirements of the destination importing nations.

39. (B) The government gains authority to regulate its pricing and distribution.
When the government declares a specific food item an essential commodity, it gains direct legal authority to regulate its production, supply, distribution, and commercial pricing. This mechanism is utilized to prevent speculative hoarding, stabilize market rates, and ensure the equitable availability of vital foodstuffs to the public during times of artificial scarcity or inflation.

40. (C) Filing a complaint with the District Consumer Commission.
If a consumer suffers illness or harm due to consuming adulterated or sub-standard food purchased from a commercial shop, they have immediate legal recourse. Under consumer protection laws, the affected individual can file a formal complaint with the District Consumer Disputes Redressal Commission to seek financial compensation and hold the seller liable.

41. (B) 2, 3, 1
The consumer dispute redressal mechanism in India is structured as a three-tier quasi-judicial hierarchy. At the local level, the District Commission serves as the initial forum. Appeals against its decisions are taken to the State Commission, while the National Commission represents the apex national body for resolving high-value consumer disputes.

42. (A) By consolidating multiple legacy laws under the Food Safety and Standards Act.
The concept of a single national food safety law was realized through the consolidation of multiple overlapping legacy orders and acts under a unified statutory framework. This integration eliminated administrative confusion, standardized regulations across all states, and created a single point of authority, streamlining compliance for food businesses while raising safety standards nationwide.

43. (B) A state-appointed officer responsible for enforcing the FSS Act.
The Commissioner of Food Safety is a senior administrative official appointed by the state government to oversee the implementation of food safety regulations. This officer is responsible for executing the provisions of the national food act within the state, directing food safety officers, managing laboratories, and taking necessary actions to protect public health.

44. (B) Marine products - Included in APEDA's mandate
The Agricultural and Processed Food Products Export Development Authority is mandated with promoting the export of specific scheduled products, including floriculture, fruits, vegetables, alcoholic beverages, and cereal products. However, marine and aquaculture products are excluded from its purview, as they fall under the dedicated promotional mandate of another specialized statutory body.

45. (A) The exporter's processing and packaging infrastructure.
When evaluating applicants for the Spice House Certificate, the Spices Board of India examines the exporter's physical processing and packaging infrastructure. This evaluation ensures that facilities possess adequate hygiene, quality control, and manufacturing capabilities to prepare spices for global markets, thereby maintaining the reputation and safety of agricultural exports.

46. (C) Bengaluru
The Coffee Board of India is a statutory organization established to promote the cultivation, processing, and export of Indian coffee. Its central administrative headquarters is located in Bengaluru, Karnataka, which serves as a major hub for coordinating agricultural research, quality evaluation, and marketing assistance for coffee growers across the primary producing states.

47. (C) A is true but R is false.
The Bureau of Indian Standards is the national standards body of India, established by domestic legislation to formulate quality standards for products, processes, and services. It is not an international organization headquartered in

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9. (D) It ensures compliance with international sanitary standards for export traceability.
Mandatory registration of seafood processing plants with the Marine Products Export Development Authority ensures compliance with strict international sanitary and phytosanitary requirements. This regulatory oversight facilitates proper export traceability throughout the supply chain. It does not exempt processors from domestic food safety legislation or import duties, but focuses on maintaining global quality standards.

10. (A) Export Inspection Council (EIC)
The Export Inspection Council is the official statutory body established under the Export Act of 1963 to oversee quality control and pre-shipment inspection. Following its rigorous certification mechanisms ensures that agricultural exports meet the quality and residue requirements of importing countries, preventing rejection due to pesticide residues or other technical non-compliance issues.

11. (B) 4, 2, 1, 3
The regulatory milestones in India occurred progressively over several decades. The Agricultural Produce Act was enacted in 1937, followed by the Prevention of Food Adulteration Act in 1954. The Essential Commodities Act was subsequently passed in 1955, and the comprehensive Food Safety and Standards Act was established much later in 2006.

12. (B) Product Liability
The legal concept of product liability under consumer protection law holds manufacturers, service providers, and sellers directly accountable for any harm caused by defective or unsafe products. When a consumer purchases a contaminated or infested food item, this statutory principle allows them to seek compensation for the sub-standard quality and safety failure.

13. (A) It focused on policing adulteration rather than science-based preventive food safety.
The primary limitation of the legacy Prevention of Food Adulteration Act was its reactive approach, which focused heavily on policing and prosecuting adulteration after it occurred. It lacked a modern, comprehensive system for science-based risk assessment and preventive safety management throughout the supply chain, necessitating a shift toward a more proactive regulatory framework.

14. (C) FSSAI and EIC - Banning domestic food business operators from exporting
Coordination between national bodies aims to streamline trade and quality assurance, rather than arbitrarily banning domestic food business operators from exporting. While other collaborations focus on harmonizing organic standards, eliminating overlapping certifications, or recognizing competent testing laboratories, the relationship between regulatory and export inspection bodies is designed to facilitate trade compliance and safety.

15. (D) To temporarily prohibit food sales in the state to protect public health.
The Commissioner of Food Safety at the state level is vested with administrative authority to implement and enforce food safety laws. To safeguard public health during emergencies or when unsafe products are detected, the commissioner has the statutory power to temporarily prohibit the manufacture, storage, distribution, or sale of specific food items.

16. (C) Cardamom Board and Spices Export Promotion Council
The Spices Board of India was constituted as a statutory body under the Spices Board Act of 1986. It was formed by merging the pre-existing Cardamom Board and the Spices Export Promotion Council. This merger unified developmental and export promotion activities for spices under a single regulatory authority under the Ministry of Commerce.

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17. (A) Both A and R are true and R is the correct explanation of A.
The Tea Board of India implements and operates an electronic auction system to facilitate the sale and distribution of tea. This digital platform enhances transparency, ensures fair competition, and assists in efficient price discovery for both producers and buyers. By replacing legacy manual systems, the electronic model modernizes and streamlines agricultural commodity trading.

18. (D) It prescribes standard quality grades for Indian coffee in export trade.
The Coffee Board of India plays a vital role in maintaining the reputation of Indian coffee in global markets. It prescribes standard quality grades for coffee destined for export, ensuring consistency and adherence to international trade requirements. The board does not ban specific

ANSWERS

1. (B) Scheduled agricultural products
The Agricultural and Processed Food Products Export Development Authority is mandated to promote and develop the export of scheduled products. These agricultural products are listed in the schedule of the governing legislative act. The authority provides financial assistance, sets quality standards, and assists in market development specifically for these scheduled agricultural commodities.

2. (A) Both A and R are true and R is the correct explanation of A.
Mandatory pre-shipment inspection of spices is implemented to ensure that exported products conform to prescribed quality specifications. Maintaining high standards is essential for safeguarding the international reputation of domestic agricultural exports. Rigorous testing prevents substandard consignments from entering global markets, directly aligning with the primary objective of preserving national trade credibility abroad.

3. (A) It issues mandatory licenses for tea exporters and regulates tea waste disposal.
The Tea Board of India regulates the domestic and international tea trade through administrative measures. It issues mandatory export licenses to maintain quality control and trade compliance. Additionally, the board regulates the disposal of tea waste to prevent its reuse as an adulterant, protecting consumer safety and ensuring the integrity of the market.

4. (C) 1, 2, and 4
The Coffee Board of India is a statutory organization established under the Coffee Act of 1942, operating under the administrative control of the Ministry of Commerce and Industry. It actively conducts scientific research, supports development, and performs quality evaluations of coffee beans. However, the board does not guarantee the purchase of all privately grown coffee.

5. (A) The ISI mark is mandatory for all primary agricultural commodities.
The Indian Standards Institute mark is not mandatory for all primary agricultural commodities, as many are covered under voluntary grading schemes. The Bureau of Indian Standards operates under the Ministry of Consumer Affairs, Food and Public Distribution, formulating national standards. Certain items, like packaged drinking water, require mandatory certification due to public health considerations.

6. (D) P-IV, Q-II, R-III, S-I
AGMARK grading classifies agricultural products based on specific physical and chemical parameters. The Directorate of Marketing and Inspection is the implementing agency responsible for enforcing these quality standards. This system is backed by the Agricultural Produce Act enacted in 1937. The Central AGMARK Laboratory, located in Nagpur, serves as the apex testing facility.

7. (B) It formulates binding food safety regulations for all street food vendors.
The National Accreditation Board for Testing and Calibration Laboratories is a constituent board of the Quality Council of India. It provides formal accreditation to laboratories based on international standards like ISO/IEC 17025, enhancing the global acceptability of test results. However, it does not formulate food safety regulations, which falls under other statutory authorities.

8. (D) Statement I is incorrect and Statement II is correct.
The National Accreditation Board for Hospitals and Healthcare Providers focuses on healthcare quality and patient safety, rather than certifying the clinical efficacy of allopathic medicines. However, collaborating with food safety authorities on initiatives like the Eat Right Campus ensures hygienic food services within hospitals, which directly aligns with patient safety and quality standards.

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streamlines trade and quality assurance. By aligning domestic safety standards with international export compliance requirements, the agencies reduce administrative redundancies. This collaboration avoids double testing for businesses, facilitating smoother export procedures while maintaining high quality and safety baselines.

29. (A) Food Safety Officer (FSO) - Primarily formulates national food safety laws
The Food Safety Officer is an enforcement official operating at the local level to inspect premises, collect samples, and ensure compliance. Formulating national food safety standards and laws is a regulatory responsibility reserved exclusively for the central food safety authority, rather than individual field officers within regional state departments.

30. (C) Establishing vapor heat treatment and irradiation facilities.
To overcome stringent sanitary and phytosanitary barriers in sensitive international markets, the export authority supports the establishment of specialized post-harvest treatment facilities. Processes like vapor heat treatment and irradiation effectively eliminate pest risks without compromising fruit quality, thereby satisfying foreign regulatory standards and facilitating the export of fresh mangoes.

31. (D) Kolkata
The Tea Board of India is a statutory body established to promote the cultivation, processing, and export of Indian tea. Its administrative headquarters is located in Kolkata, West Bengal. This location serves as the central hub for directing developmental activities, auction monitoring, and trade coordination across the major tea-producing regions.

32. (A) Both A and R are true and R is the correct explanation of A.
The Coffee Board of India focuses extensively on scientific research and technological development to support the coffee industry. Developing disease-resistant cultivars and improving overall crop yields are essential to protect plantations from devastating pests like leaf rust, thereby maintaining the productivity and global competitiveness of domestic coffee growers in international trade.

33. (B) Infant formula and food additives require mandatory BIS certification.
The Bureau of Indian Standards operates both voluntary and mandatory certification schemes. While many standards are optional, specific high-risk products, including infant formula, dairy substitutes, and certain food additives, are placed under mandatory certification to guarantee safety. In these cases, manufacturing facilities must obtain the certification mark prior to commercial sale.

34. (D) 1, 3, and 4
The quality grading system is legally backed by the Agricultural Produce Act of 1937, utilizing physical and chemical standards rather than packaging alone. Certain sensitive items, such as blended edible vegetable oils require mandatory certification under this framework. The apex analytical operations are conducted at the Central AGMARK Laboratory situated in Nagpur.

35. (A) NABL establishes the maximum residue limits (MRLs) for pesticides in food.
The National Accreditation Board for Testing and Calibration Laboratories is an accreditation body, not a regulatory standard-setting agency. Establishing maximum residue limits for pesticides in food commodities is the responsibility of statutory food safety regulators. The board's role is to assess and recognize the technical competence of testing laboratories performing such analyses.

36. (C) P-II, Q-IV, R-I, S-III
National organizations issue specific standard marks and certificates to verify product quality. The Bureau of Indian Standards administers the industrial standard mark, while the Directorate of Marketing and Inspection implements agricultural grading. The Spices Board grants infrastructure-related certifications for exporters, and the central food authority issues licensing numbers and logos for domestic sales.

37. (A) NCDRC
Several statutory bodies are dedicated to facilitating and promoting agricultural, marine, and food exports from India by setting standards and inspecting products. Conversely, the National Consumer Disputes Redressal Commission is a specialized quasi-judicial tribunal established under consumer protection laws to resolve domestic consumer grievances and disputes rather than regulating or promoting international trade.

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57. (D) By enforcing FSSAI regulations on the ground level.
Under the coordinated food safety framework, the central authority is responsible for formulating unified national standards, policies, and licensing procedures. State Food Departments act as the primary execution and enforcement arms, utilizing food safety officers and designated district officials to implement these regulations, inspect local businesses, and conduct surveillance on the ground.

58. (A) Products listed in the APEDA Act scheduled for export promotion.
In the context of export development, scheduled products are the specific agricultural and processed food items listed in the schedule of the governing APEDA Act. The authority is legally mandated to promote, develop, and coordinate the export trade of these designated commodities, which include fruits, vegetables, meat products, and poultry.

59. (B) Nodal Ministry - Ministry of Health and Family Welfare
The Spices Board of India is a statutory organization established to promote the export of cardamom and other scheduled spices. While it ensures safety and quality control, it functions under the administrative control of the Ministry of Commerce and Industry, rather than the Ministry of Health and Family Welfare, which manages domestic health regulations.

60. (B) Implementing a pan-India electronic auction (e-auction) system.
To foster fair competition and transparent pricing within the domestic tea sector, the Tea Board implemented a pan-India electronic auction system. This digital platform allows tea producers and registered buyers from various regions to trade efficiently. It replaces older, opaque bidding methods and ensures better price discovery based on objective quality characteristics.

61. (A) ISI Mark
The Bureau of Indian Standards administers standard certification marks to indicate conformity with national quality guidelines. For industrial goods, consumer products, and specific processed food items, the standard mark issued is the ISI mark. This emblem provides assurance to consumers that the certified product complies with rigorous quality and safety standards.

62. (A) Both A and R are true and R is the correct explanation of A.
The AGMARK grade serves as an important benchmark for quality in agricultural commodities. These standards are scientifically formulated by evaluating intrinsic quality factors, such as moisture levels, free fatty acids, and the presence of potential adulterants. This detailed analytical grading provides reliable, objective quality assurance to buyers and consumers in the market.

63. (D) NABL uses the standard ISO/IEC 17025 for assessing testing laboratories.
The National Accreditation Board for Testing and Calibration Laboratories is the authorized body for accrediting technical facilities in India. It evaluates both public and private testing laboratories using the internationally recognized standard ISO/IEC 17025. This process ensures that laboratories possess the necessary technical competence, equipment, and quality management systems to produce reliable results.

64. (C) 1, 2, and 4
The National Accreditation Board for Hospitals and Healthcare Providers operates as a constituent board under the Quality Council of India to accredit healthcare organizations. Its comprehensive quality standards cover clinical care and critical support services, including hospital dietary and food services. However, it does not possess statutory judicial powers to prosecute food adulterers.

65. (B) It prohibits exporting value-added seafood.
The Marine Products Export Development Authority, headquartered in Kochi under the Ministry of Commerce and Industry, is mandated to promote and expand marine exports. Far from prohibiting them, the authority actively encourages and provides technical and financial assistance for the development and export of value-added seafood products to increase earnings from global markets.

66. (D) P-III, Q-IV, R-II, S-I
National organizations operate under distinct administrative ministries and parent bodies to fulfill their functions. Export-oriented and statutory trade promotion bodies function under the commerce ministry, while national standardization agencies report to consumer affairs. Independent laboratory accreditation services are coordinated through the Quality

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Geneva, though it represents India in global bodies like the International Organization for Standardization to align domestic and global quality systems.

48. (C) It is a quality-based grading scheme for agricultural commodities.
AGMARK is a statutory quality-based grading and marking scheme designed specifically for agricultural commodities in India. Implemented by the Directorate of Marketing and Inspection, the system assesses and certifies products like edible oils, pulses, and spices based on physical and chemical parameters to assure consumers of their purity and grade quality.

49. (B) 1, 2, and 4
The National Accreditation Board for Testing and Calibration Laboratories operates as a constituent board under the Quality Council of India. It formally evaluates and certifies the technical competence of testing laboratories. While the central food safety authority utilizes these accredited laboratories for food sample testing, NABL itself lacks any statutory power to penalize businesses.

50. (D) NABH is a statutory body under the Ministry of Agriculture and Farmers Welfare.
The National Accreditation Board for Hospitals and Healthcare Providers is a constituent board of the Quality Council of India, not a statutory body under agricultural ministries. It establishes quality protocols for patient safety, infection control, and healthcare services. This includes auditing hospital kitchens and dietary departments to ensure strict hygiene standards are met.

51. (A) P-III, Q-IV, R-II, S-I
The legislative frameworks and statutory boards address distinct regulatory needs within the food sector. Price controls are managed through commodity supply regulations, while unfair trade practices are handled under consumer protection tribunals. Export promotion for specialty products is handled by dedicated commodity boards, and historical food adulteration controls were administered under legacy acts.

52. (C) Domestic Retail Audit (DRA)
The Export Inspection Council utilizes specific mechanisms to certify the quality and safety of products destined for international trade. These systems include consignment-wise inspection, continuous in-process quality control, and self-certification for established manufacturers. However, conducting domestic retail audits is outside its scope, as it focuses on export quality rather than domestic retail markets.

53. (C) Statement I is correct and Statement II is incorrect.
The Essential Commodities Act of 1955 grants the government regulatory powers to control the production, supply, and distribution of critical items during emergencies to prevent hoarding. However, the act does not guarantee a fixed Minimum Support Price for all agricultural products, as price support mechanisms are handled through separate administrative policies and programs.

54. (D) It holds manufacturers and sellers liable for harm from defective products.
The introduction of product liability under consumer protection laws represents a significant shift in accountability. This legal framework holds product manufacturers, service providers, and sellers directly liable for compensating consumers for any personal injury, property damage, or harm resulting from defective, adulterated, or unsafe products, ensuring stronger consumer protection in the marketplace.

55. (B) The absence of science-based hazard and risk assessment protocols.
The legacy approach under the old food adulteration law focused primarily on detecting physical adulterants through end-product inspection. This system was limited by the complete absence of science-based hazard analysis and preventive risk assessment protocols. Modern food safety practices prioritize identifying and controlling chemical, microbiological, and physical risks throughout the entire manufacturing process.

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56. (C) Designated Officer - Sanctions fine-related prosecutions
The enforcement hierarchy under the food safety act assigns clear administrative duties. While food safety officers inspect premises and lift samples, and food analysts perform laboratory chemical testing, the Designated Officer operates at the district level. This official has the authority to issue licenses, review analytical reports, and sanction prosecutions for minor infractions.

by historical legislation. The Agricultural Produce (Grading and Marking) Act, which provides the statutory framework for the AGMARK system, was enacted in 1937. It empowers the government to establish quality standards and grades for primary agricultural goods.

77. (A) Both A and R are true and R is the correct explanation of A.
Obtaining laboratory accreditation is highly valuable for food testing facilities in India. Central food safety regulations require that primary food testing laboratories must be accredited by NABL to receive formal notification and recognition from the authority. This mandate makes accreditation essential for any laboratory wishing to conduct official regulatory food analyses.

78. (C) It evaluates hospital biomedical and food waste disposal protocols.
The National Accreditation Board for Hospitals and Healthcare Providers establishes standards to ensure patient safety and clinical quality. As part of its comprehensive assessment of hospital infrastructure, the board evaluates the management of support services, including hospital dietary hygiene, nutritional services, and the proper disposal of biomedical and food waste.

79. (D) 1, 2, and 4
The Marine Products Export Development Authority is responsible for promoting marine exports, including fish and shrimp. It operates traceability programs, such as catch certificate schemes, to counter illegal fishing and implements infrastructure modernization programs. However, setting domestic retail prices for freshwater fish falls outside its export-oriented promotional and statutory mandate.

80. (C) EIC certification is mandatory for every export regardless of destination rules.
The Export Inspection Council is a statutory advisory body established under the Export Act of 1963 to manage quality control and inspection. While it provides assurance through robust quality systems, its certification is not universally mandatory for every single export shipment, as requirements depend on the specific regulations of importing countries.

81. (B) P-III, Q-I, R-IV, S-II
Different legislative acts address distinct regulatory objectives within the food and commercial sectors. Supply and price controls are regulated under commodity laws, and consumer rights are protected under dedicated consumer acts. Historical food purity was managed under older adulteration legislation, whereas contemporary practices rely on a comprehensive, risk-based safety framework.

82. (D) The right to arrest a retailer without police intervention.
The Consumer Protection Act of 2019 safeguards consumer rights by ensuring protection against hazardous goods, providing access to product information, and establishing redressal forums for unfair trade practices. However, consumers do not possess any statutory authority to arrest retailers, as law enforcement and criminal procedures are handled by authorized police services.

83. (A) Both Statement I and Statement II are correct.
The legacy food act relied heavily on end-product testing and prosecuting violators to control adulteration. In contrast, the modern food safety act introduced a preventive approach that emphasizes industry self-compliance, scientific risk assessment, and capacity building. This transition shifted the regulatory focus from reactive policing to a holistic, preventive safety management system.

84. (C) It enables paperless and risk-based import clearance, reducing transit time.
Coordination between the central food safety authority and customs departments through integrated digital platforms streamlines the clearance of imported foods. This integration enables paperless processing and risk-based screening of food shipments, which reduces transit times and administrative delays at ports while maintaining rigorous safety checks on incoming food products.

85. (A) Designated Officer
Under the national food safety act, the Designated Officer is the administrative head of food safety in a district. When there is an immediate risk of widespread food contamination or adulteration, this official has the statutory authority to take emergency measures, including prohibiting the sale of unsafe food items within the district.

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Council of India to maintain technical competence across various sectors.

67. (A) Consumer dietary preferences
The Essential Commodities Act empowers the government to regulate key commercial aspects of declared essential commodities to prevent shortages and stabilize prices. This authority includes setting maximum retail prices, imposing stock limits on wholesalers, and directing distribution channels. However, the legislation does not regulate or influence individual consumer dietary preferences or food habits.

68. (A) Both Statement I and Statement II are correct.
The Central Consumer Protection Authority was established under consumer protection laws to protect, promote, and enforce consumer rights. To ensure public safety, the authority possesses statutory powers to investigate violations, penalize misleading advertisements, and issue binding directions to recall products that are found to be dangerous, hazardous, or unsafe for public consumption.

69. (A) It consolidated multiple orders (like FPO, MMPO, MFPO) into a single regulatory framework.
Replacing the legacy food adulteration law with the modern food safety act simplified the regulatory environment. This comprehensive legislation consolidated various overlapping sector-specific orders and laws into a single, unified regulatory framework. It established a centralized authority to oversee standards, eliminating administrative fragmentation and providing a consistent approach to food safety nationwide.

70. (D) Seize samples and issue an improvement notice under the FSS Act.
Under the current food safety act, a food safety officer has specific statutory procedures for handling non-compliant businesses. When discovering a dairy operating without a license and producing substandard products, the officer is authorized to seize samples for analysis and issue a formal improvement notice to enforce safety and administrative compliance.

71. (A) 2, 4, 1, 3
The standard enforcement process by state food departments follows a logical sequence. The food safety officer first inspects the business premises and draws suspected food samples. These collected samples are then sent to the food analyst, who conducts laboratory testing and submits the official analysis report to the designated district officer.

72. (C) FSSAI recognizes NPOP certification for domestic sale.
To streamline the trade of organic products, the central food safety authority coordinates with agricultural export bodies. It formally recognizes the organic certification granted under the National Programme for Organic Production for domestic sales. This recognition avoids dual certification, allowing products certified for export to be sold as organic in local markets.

73. (D) Recognition for exporters with high-quality processing infrastructure.
The Spice House Certificate is an official recognition awarded by the Spices Board of India to export enterprises. It certifies that the exporter possesses high-quality processing, cleaning, and packaging infrastructure that meets stringent quality benchmarks. This certification helps exporters demonstrate their capability to maintain hygiene and safety, facilitating smoother international trade.

74. (A) Head Office - Darjeeling
The Tea Board of India was established as a statutory body under the Tea Act of 1953 to develop the tea industry. While Darjeeling is a major tea-producing region, the board's head office is located in Kolkata. The board oversees cultivation, processing, export promotion, and quality mechanisms like the electronic auction system.

75. (B) To ensure exports meet international cup quality standards.
The primary objective of the Coffee Board's quality evaluation standards is to ensure that outward-bound shipments meet international cup quality and sensory standards. By setting strict quality parameters and grading profiles, the board protects the global reputation of Indian coffee, assisting growers in achieving premium prices and maintaining competitiveness in international markets.

76. (B) 1937
The quality grading and marking system for agricultural commodities in India is legally backed

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varieties or mandate chemical decaffeination, but focuses on quality development.

19. (A) 1, 2, and 4
The Bureau of Indian Standards is a statutory body established under the BIS Act of 2016, granting the ISI mark as a symbol of quality. It represents India in international standardizing organizations like ISO. While it formulates comprehensive standards, these standards are not always mandatory for every food business, as many remain voluntary.

20. (C) It is legally mandatory for all farmers selling raw produce in local village markets.
AGMARK is a quality certification mark used on agricultural products based on physical and chemical profiles, managed by the Directorate of Marketing and Inspection. While it provides assurance of quality, it is not legally mandatory for all individual farmers selling raw, unprocessed produce directly in local or traditional village retail markets.

21. (A) P-II, Q-IV, R-III, S-I
The various national bodies serve specific regulatory and accreditation roles. The laboratory accreditation board evaluates testing capabilities, while healthcare organizations receive accreditation through a dedicated health board. Domestic food safety standards are formulated by a central authority, and pre-shipment quality inspections for exports are managed by a specialized inspection council.

22. (D) Licensing of local street food vendors outside hospital premises.
The National Accreditation Board for Hospitals and Healthcare Providers establishes standards for patient safety and quality within hospital premises. This includes monitoring the hygiene of internal dietary services, evaluating patient meal nutrition, and managing hospital outbreaks. However, licensing external commercial food vendors operating outside hospital grounds is completely beyond its scope.

23. (C) Statement I is correct and Statement II is incorrect.
The Marine Products Export Development Authority actively supports the seafood export sector by providing financial and technical assistance to upgrade processing plant infrastructure. Far from being prohibited, participating in and organizing international seafood trade fairs is a primary activity of the authority, designed to promote Indian marine products in global markets.

24. (C) It certifies that the shipment meets specified export quality standards.
A Certificate of Inspection issued by the Export Inspection Council provides formal assurance that the designated export consignment complies with specified quality and safety standards. This documentation facilitates international trade by demonstrating conformity to the importing country's requirements, although it does not exempt shipments from customs duties or domestic licensing laws.

25. (D) Essential Commodities Act, 1955
The Essential Commodities Act of 1955 empowers the government to regulate the production, supply, distribution, and pricing of essential items. During shortages or emergencies, this legislative framework allows authorities to impose strict stock-holding limits on traders to prevent hoarding, speculative black-marketing, and unfair price manipulation of vital food items.

26. (A) State Commission - Entertains complaints where the value is between Rs. 1 Crore and Rs. 10 Crores
Under the Consumer Protection Act of 2019, specific pecuniary jurisdictions were established for the three-tier dispute redressal commissions to streamline claims. The State Commission is empowered to handle consumer complaints where the value of goods or services paid as consideration falls within the statutory range of one crore to ten crore rupees.

27. (B) From reactive policing to proactive risk-based safety management.
The transition from legacy food regulations to the modern unified act marked a significant shift in safety philosophy. Rather than relying on reactive policing and punitive measures after adulteration occurred, the new framework introduced a proactive approach centered on science-based risk assessment, preventive measures, and self-compliance across the food supply chain.

28. (B) To align domestic safety regulations with export compliance standards to avoid dual testing.
Coordination between the central food safety authority and export development bodies

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86. (D) NPOP - National Programme for Organic Production
The Agricultural and Processed Food Products Export Development Authority coordinates several programs to facilitate agricultural trade. It acts as the secretariat for the National Programme for Organic Production, which sets standards for organic farming and exports. The authority's digital traceability systems, like HortiNet, are designed for horticultural crops rather than marine exports.

87. (B) By establishing recognized quality standards that remove the need for pre-purchase physical inspection.
Quality grading implemented by the Spices Board of India establishes recognized standards based on physical, chemical, and hygiene parameters. By providing reliable quality classifications, these grades remove the need for buyers to perform pre-purchase physical inspections of every consignment. This system builds trust, standardizes commercial contracts, and facilitates international spice trade.

88. (C) It supports the industry in maintaining standards like Darjeeling Tea GI specifications.
The Tea Board of India supports the industry by maintaining rigorous quality standards and protecting geographical indications, such as Darjeeling Tea. By establishing strict specifications for harvesting, processing, and origin, the board ensures the authenticity of specialized tea products. This oversight prevents counterfeiting and helps maintain premium value in international markets.

89. (D) Certification - Issues mandatory ISI marks for coffee
The Coffee Board of India is a statutory body established under the Coffee Act of 1942, headquartered in Bengaluru to promote Arabica and Robusta coffee. While the board sets quality standards for exports and conducts evaluations, it does not issue the ISI mark, which is a standard mark administered by the Bureau of Indian Standards.

90. (A) To gain a competitive advantage by demonstrating verified product quality.
Obtaining a voluntary quality certification mark allows food manufacturers to demonstrate that their products meet national benchmarks for safety and consistency. This certified quality builds consumer trust, enhances brand reputation, and provides a significant competitive advantage in the marketplace. It does not exempt a facility from mandatory local food safety licensing and inspections.

91. (B) ISO/IEC 17025
The National Accreditation Board for Testing and Calibration Laboratories evaluates and accredits testing and calibration facilities. To assess technical competence, the board utilizes the internationally recognized standard ISO/IEC 17025. This standard specifies the general requirements for the competence, impartiality, and consistent operation of laboratories performing scientific food analyses.

92. (A) Both A and R are true and R is the correct explanation of A.
Hospitals seeking healthcare accreditation must implement strict food safety and hygiene protocols within their dietary services. Vulnerable patients with compromised immune systems are highly susceptible to foodborne pathogens. Maintaining high hygiene standards in hospital kitchens minimizes the risk of hospital-acquired infections, which is critical for ensuring patient safety and recovery.

93. (A) It implements traceability programs from catch to export.
The Marine Products Export Development Authority implements traceability programs to track seafood from harvest to final export. This system ensures that marine exports comply with international quality and sustainable fishing regulations. As a statutory body under the Ministry of Commerce, its work supports exporters nationwide rather than being limited to a single state.

94. (C) 1, 2, 3, and 4
The Export Inspection Council is the official statutory export certification body of India, established under the Export Act of 1963. It operates testing laboratories and quality certification systems that are recognized globally. This recognition facilitates international trade by ensuring that exported agricultural and food products satisfy the quality expectations of importing countries.

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body operating under the Quality Council of India. Its scope includes evaluating the technical competence of testing and calibration laboratories. It does not possess any regulatory power to issue licenses for food manufacturing, which is the role of food safety regulators.

135. (B) To protect vulnerable patients with compromised immunity from foodborne infections.
Maintaining strict food safety and hygiene in healthcare facilities is essential to protect vulnerable patients who may have compromised immune systems. Pathogens in contaminated food can lead to severe foodborne infections, complicating clinical recovery. Collaborative enforcement of safety standards ensures that hospital kitchens prepare meals under highly clean and monitored conditions.

136. (C) To ensure products meet the standards of importing countries.
The primary focus of the Export Inspection Council is to facilitate international trade by ensuring that exported food and agricultural products meet specified quality and safety standards. Through pre-shipment inspections and quality systems, the council certifies that exports comply with the technical regulations and requirements of various importing nations.

137. (A) Both A and R are true and R is the correct explanation of A.
The Essential Commodities Act empowers the government to regulate the trade and commerce of designated foodstuffs. This legal intervention aims to ensure the equitable distribution and continuous availability of essential items. By regulating supply and pricing during shortages, the act protects consumers, preventing price manipulation, hoarding, and speculative inflation.

138. (A) Consumers can file complaints directly without mandatory legal representation.
The dispute redressal mechanism under consumer protection laws is designed to be accessible and consumer-friendly. Affected individuals can file complaints directly with the consumer commissions without the mandatory requirement of hiring a lawyer or having formal legal representation. This procedure simplifies the dispute process, reducing costs and delays for ordinary consumers.

139. (B) 1, 2, and 3
The Prevention of Food Adulteration Act of 1954 was heavily focused on penalizing end-product adulteration rather than proactive prevention. It required a multi-layered licensing system managed across different ministries, which led to regulatory fragmentation. The act lacked modern, risk-based safety frameworks and was eventually repealed and replaced by contemporary food safety legislation.

140. (B) State Food Departments can permanently override FSSAI rules.
Under the national food safety framework, the central food safety authority is responsible for formulating unified standards, regulations, and licensing policies. State Food Departments act as the primary enforcement arm on the ground. However, state departments do not possess the statutory power to permanently override or alter these central safety regulations.

141. (A) P-IV, Q-III, R-I, S-II
Enforcement of food safety regulations at the state level relies on a structured hierarchy of officials. The Commissioner of Food Safety heads the state enforcement mechanism. The Designated Officer manages the district, issuing licenses and sanctioning prosecutions. Food safety officers inspect premises and lift samples, while food analysts test samples in laboratories.

142. (C) Unprocessed marine fish
The Agricultural and Processed Food Products Export Development Authority is mandated to promote the export of various scheduled products. Its scope includes meat products, jaggery, sugar, cocoa products, fruits, and vegetables. However, unprocessed marine fish and aquaculture products are excluded, as they fall under a separate seafood development authority.

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143. (D) Statement I is incorrect and Statement II is correct.
The Spices Board of India issues the Spice House Certificate to recognize exporters with high-quality processing infrastructure, rather than as a mandatory license for domestic retailers. Additionally, the board actively promotes the export of value-added spices, such as spice oils and oleoresins, to maximize foreign exchange earnings and support technological development.

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105. (D) Mustard oil
AGMARK is a quality certification mark used for agricultural products in India. It is applied to primary and semi-processed agricultural commodities, such as pulses, spices, and edible vegetable oils like mustard oil. The certification evaluates physical and chemical parameters to verify purity, grading, and conformity to prescribed agricultural quality standards.

106. (A) It must maintain statutory FSSAI compliance.
For a hospital dietary department to meet the quality standards required for healthcare accreditation, it must comply with national food safety regulations. Maintaining statutory registration or licensing under the central food safety authority is an essential requirement. This compliance ensures that patient meals are prepared under hygienic, safe, and monitored conditions.

107. (A) Both A and R are true and R is the correct explanation of A.
The Marine Products Export Development Authority has the statutory authority to inspect processing plants, raw materials, and finished marine products. This inspection is conducted to ensure that exported products comply with the sanitary and phytosanitary requirements of importing nations, preventing trade barriers and maintaining the global reputation of Indian seafood exports.

108. (B) It can involve continuous In-Process Quality Control monitoring.
Certification by the Export Inspection Council provides assurance that exported food and agricultural products meet quality and safety parameters. This certification process can involve continuous in-process quality control monitoring throughout production, rather than relying solely on end-product testing. This proactive approach ensures that facilities maintain consistent standards during the manufacturing process.

109. (A) 1, 2, and 3
The Essential Commodities Act of 1955 regulates key goods to protect consumers from price hikes and shortages. Under this framework, the government can impose stock limits on wholesalers and retailers, and confiscate hoarded items. The act applies to both agricultural foodstuffs, such as edible oils, and essential non-agricultural items.

110. (C) It operates under the Ministry of Commerce and Industry.
The Central Consumer Protection Authority was established to protect and enforce consumer rights. It has the statutory power to investigate violations, recall unsafe food products, and penalize misleading advertisements. Administratively, the authority operates under the Ministry of Consumer Affairs, Food and Public Distribution, rather than the Ministry of Commerce and Industry.

111. (D) P-IV, Q-III, R-II, S-I
The various national legislative frameworks serve distinct regulatory functions within the food and standard sectors. Price and supply regulations are managed through essential commodity acts, while product standardization is handled through the national standard bureau. Modern food safety relies on a holistic, risk-based approach, replacing older, prosecution-heavy adulteration laws.

112. (C) FSSAI delegating enforcement permanently to state police.
Coordination between the central food safety authority and other national bodies includes harmonizing agricultural standards, utilizing accredited laboratories, and conducting joint export inspections. However, the authority does not delegate its core enforcement powers permanently to the state police, as enforcement remains the statutory responsibility of designated food safety enforcement officers.

113. (A) Both Statement I and Statement II are correct.
The Food Safety Officer is an enforcement official within the State Food Department hierarchy under the food safety act. This officer is responsible for conducting inspections of food businesses, lifting samples of suspected food articles for analysis, and seizing products that appear to violate safety regulations to protect public health.

114. (D) They enable exporters to upgrade infrastructure and improve packaging to boost competitiveness.
Financial assistance schemes provided by the export authority support the agricultural export sector. These grants allow exporters to upgrade their processing infrastructure, set up cold storage facilities, and improve packaging quality. This developmental support enhances product shelf life and safety, helping exporters satisfy

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CHAPTER 29

CODEX Alimentarius, JECFA, JEMRA and JMPR

1. In which year was the Codex Alimentarius Commission (CAC) established by the Joint FAO/WHO Food Standards Programme?
(A) 1945
(B) 1955
(C) 1963
(D) 1995

2. Match the Codex organizational bodies in List I with their primary functions in List II and select the correct option:
List I: (Codex Organizational Bodies)
P. Codex Alimentarius Commission
Q. Executive Committee
R. Codex Secretariat
S. Subsidiary Bodies
List II: (Primary Functions)
I. Provides administrative support and coordinates meetings
II. Final decision-making body for adopting standards
III. Drafts standards and guidelines for specific areas
IV. Acts as the executive organ managing the standard-setting process
(A) P-IV, Q-II, R-III, S-I
(B) P-II, Q-I, R-IV, S-III
(C) P-II, Q-IV, R-I, S-III
(D) P-I, Q-IV, R-II, S-III

3. Which of the following statements correctly describes the composition of the Executive Committee of the Codex Alimentarius Commission?
(A) It consists of the Chairperson, Vice-Chairpersons, and six regional coordinators.
(B) It comprises the Chairperson, Vice-Chairpersons, and permanent donor delegates.
(C) It includes nominated representatives from all member countries of the United Nations.
(D) It is composed of scientific advisors appointed by the FAO and WHO Directors-General.

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4. How is the term "Codex Alimentarius" formally defined in the context of international food safety?
(A) A legally binding treaty regulating global agricultural and food trade practices.
(B) A bilateral trade agreement between the European Union and the United States.
(C) A peer-reviewed scientific journal focusing on public health and food safety.
(D) A collection of internationally adopted food standards and related guidelines.

5. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): The Codex Alimentarius Commission operates as an intergovernmental body under the joint auspices of the FAO and WHO.
Reason (R): The primary dual mandate of the CAC is to protect the health of consumers and ensure fair practices in the food trade.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

6. Identify the incorrect statement regarding the membership and structure of the Codex Alimentarius Commission.
(A) Membership to the Commission is open to all Member Nations and Associate Members of FAO and WHO.
(B) Member countries are responsible for establishing a National Codex Contact Point.
(C) International non-governmental organizations (NGOs) can participate as members with full voting rights.
(D) The Codex Secretariat is headquartered at the FAO in Rome.

mediation as an alternate dispute resolution mechanism. It also established product liability for both manufacturers and sellers, ensuring comprehensive accountability for defective products in the market.

125. (A) It heavily emphasized the principle of "safe food by design" and self-regulation.
The legacy Prevention of Food Adulteration Act of 1954 focused primarily on policing and prosecuting adulteration after it occurred, rather than emphasizing self-regulation or preventive safety. It operated in administrative silos alongside other sector-specific orders until it was repealed and replaced by contemporary, comprehensive food safety legislation.

126. (C) P-IV, Q-I, R-III, S-II
National coordination between food safety authorities and other specialized bodies ensures regulatory efficiency. Collaborations align organic standards for exports, while partnerships with standard bodies eliminate duplicate product marks. Joint work with accreditation boards verifies laboratory testing competence, and coordination with inspection councils ensures that export-bound food products satisfy global quality requirements.

127. (D) Drafting national food security laws.
The Designated Officer operates at the district level to administer food safety laws. This statutory role includes issuing and cancelling licenses for food businesses, receiving analytical reports, and sanctioning prosecutions. However, drafting national food security laws is a legislative responsibility reserved for the central government, national ministries, and Parliament.

128. (C) Statement I is correct and Statement II is incorrect.
The Agricultural and Processed Food Products Export Development Authority is responsible for promoting and developing the export of scheduled products like fruits, vegetables, and their products. However, the authority has no role in setting domestic pricing policies, as determining the minimum support price for agricultural crops is handled by separate government advisory bodies.

129. (B) It reduces import-rejection rates, protecting the global brand of Indian spices.
Mandatory quality testing implemented by the Spices Board of India ensures that spice exports comply with international chemical residue and contaminant limits. This pre-shipment quality control reduces import-rejection rates in foreign markets, protecting the global brand reputation of Indian spices and supporting long-term trade sustainability for domestic growers.

130. (D) Tea Board of India
The Tea Board of India is the statutory body responsible for regulating the tea trade and promoting quality standards. When an international buyer requires specific tea leaf grading, such as Orange Pekoe, the board's standard guidelines and promotional frameworks ensure the integrity, classification, and authenticity of the tea products exported.

131. (A) 1, 2, 3
The Coffee Board of India establishes standardized quality grades based on coffee bean processing and species. Plantation A, which represents washed Arabica, represents the highest premium grade due to its mild flavor. Arabica Cherry, which is unwashed Arabica, follows, while unwashed Robusta Cherry represents a lower-priced commercial grade.

132. (C) Government mandates that the product cannot be sold without the ISI mark due to public safety.
The distinction between mandatory and voluntary certification by the national standards body lies in legal enforcement. Under mandatory certification, the government requires that a product carry the ISI mark before it can be sold, typically to protect public health and safety. Voluntary certification is optional, allowing manufacturers to demonstrate superior quality.

133. (A) It certifies agricultural commodities based on purity and physicochemical traits.
AGMARK is a quality certification mark used on primary and semi-processed agricultural commodities in India. The grading scheme certifies products based on physical, chemical, and purity traits. This grading ensures that commodities conform to specified standards of quality, assisting consumers in identifying genuine and authentic agricultural products in the marketplace.

134. (D) Regulatory Power - Issues licenses to operate food manufacturing plants
The National Accreditation Board for Testing and Calibration Laboratories is an accreditation

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95. (D) Declared commodities can never be removed from the schedule.
The Essential Commodities Act allows the government to regulate the supply and pricing of essential foodstuffs to protect consumers. The scheduled list of essential commodities is flexible; the central government has the statutory authority to add or remove items based on market conditions, supply levels, and prevailing national economic requirements.

96. (C) P-II, Q-III, R-I
The consumer dispute redressal system utilizes a tiered structure with specific pecuniary jurisdictions for filing complaints. Claims involving values up to fifty lakh rupees are filed with the District Commission. The State Commission handles disputes between fifty lakhs and two crore rupees, while the National Commission resolves high-value claims exceeding two crore rupees.

97. (B) Rigorous, science-based risk analysis and assessment.
The legacy food act had several regulatory drawbacks, including a highly fragmented system with multiple overlapping food laws, a lack of a single centralized authority, and an overemphasis on end-product prosecution. However, it completely lacked rigorous, science-based risk analysis and assessment protocols, which were only introduced later with modern food safety legislation.

98. (C) Statement I is correct and Statement II is incorrect.
The central food safety authority coordinates with the national standards body to align food specifications, reducing overlapping certification burdens on businesses. However, in the event of any conflict regarding food safety and quality standards, the regulations formulated by the statutory food safety authority strictly override those of any other standardization body.

99. (A) The FBO must immediately cease all licensed operations.
When a Designated Officer suspends the food business license of an operator due to non-compliance or safety violations, the business must immediately cease all operations covered under that license. Operating during a suspension is a serious administrative violation, and the suspension remains in effect until the operator addresses the specified issues.

100. (C) APEDA
The Agricultural and Processed Food Products Export Development Authority operates Tracenet, an internet-based electronic traceability system. This system tracks the organic supply chain from farm production to final export. It ensures that products like organic honey comply with national and international organic certification standards, verifying authenticity for global buyers.

101. (A) 2, 4, 3, 1
The standard export certification process for spices follows a systematic sequence. The exporter must first register with the Spices Board of India. When preparing a shipment, the exporter submits consignment details, allowing board officials to draw samples for analysis. Once laboratory testing is complete, the board issues the analytical report and clearance.

102. (D) Geographical Indication
The Tea Board of India supports the industry by maintaining quality standards and protecting geographical indications, such as Darjeeling Tea. This geographical relationship is legally protected under the Geographical Indications framework. This intellectual property designation prevents unauthorized use of the name, protecting both producers and consumers from counterfeit regional products.

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103. (B) It is a sensory evaluation process to assess coffee quality.
Cupping is a standardized sensory evaluation process used by the Coffee Board of India to assess the quality, aroma, and flavor profile of coffee beans. Trained professionals evaluate samples based on specific characteristics, including body, acidity, and cleanliness. This evaluation determines the cup quality, which is essential for grading and pricing coffee exports.

104. (C) Nodal Ministry - Ministry of Health
The Bureau of Indian Standards was established under the BIS Act of 2016 to formulate quality standards and issue the ISI mark. It mandates certification for sensitive items like infant milk substitutes. Administratively, the national bureau operates under the Ministry of Consumer Affairs, Food and Public Distribution, rather than the Ministry of Health.

144. (C) It controls disposal to prevent tea waste from being used as an adulterant.
The Tea Board of India regulates the tea industry to maintain high standards of quality and safety. To protect consumer safety, the board strictly controls the disposal of tea waste generated during manufacturing. This regulation prevents tea waste from being chemically treated, repackaged, or used as an adulterant in loose tea products.

145. (B) Coffee Board of India
The Coffee Board of India is the statutory body responsible for promoting the production, quality, and export of Indian coffee. For unique regional coffees like Monsooned Malabar, the board provides the necessary quality specifications, promotional assistance, and market intelligence to help exporters navigate international markets and achieve premium value.

146. (D) ISI Mark - Certification mark for industrial and food products
The Bureau of Indian Standards is the national standards body of India, headquartered in New Delhi. The BIS Act of 2016 modernizes standardization and conformity assessment procedures. Under this framework, the ISI mark is administered as a certification mark verifying that industrial goods and specific food products comply with national quality and safety standards.

147. (A) FSSAI enforces safety baselines, while AGMARK grades quality traits.
The primary difference between the two systems lies in their regulatory focus. The central food safety authority enforces mandatory minimum safety baselines to protect public health, making compliance necessary for all food businesses. In contrast, the agricultural grading scheme classifies commodities based on quality, purity, and physicochemical traits, providing grade-based quality assurance.

148. (C) Formal recognition of a laboratory's technical competence to perform tests.
Accreditation by the national board is a formal recognition of a laboratory's technical competence to perform specific testing or calibration activities. This assessment is conducted based on international standard criteria. It provides assurance to regulators, businesses, and consumers that the laboratory is capable of producing accurate, reliable, and technically valid results.

149. (A) Standard-setting authority - Dictates retail prices of surgical tools
The National Accreditation Board for Hospitals and Healthcare Providers focuses on healthcare quality and patient safety. It operates under the Quality Council of India and evaluates various hospital services, including dietary kitchen hygiene. However, it does not possess any authority to dictate the retail prices of surgical tools or medical clinical equipment.

150. (D) To promote and develop the marine products export industry.
The overarching goal of the Marine Products Export Development Authority is to promote and develop the marine products export industry. Established by statutory legislation, the authority supports the sector by improving processing infrastructure, enforcing quality standards, and implementing traceability systems. This development enhances the competitiveness of Indian seafood in international markets.

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15. Which of the following best describes the fundamental distinction between Codex Standards and Codex Guidelines?
(A) Standards are legally binding under domestic laws, whereas Guidelines are entirely voluntary advice.
(B) Standards set specific quantitative limits, whereas Guidelines provide general policy frameworks.
(C) Standards apply only to chemical food safety hazards, whereas Guidelines address biological agents.
(D) Standards require a consensus vote by the plenary, whereas Guidelines require a simple majority.

16. What is the legal status of Codex texts (standards, guidelines, and codes of practice) for member countries upon adoption by the Commission?
(A) They instantly become mandatory domestic regulations upon adoption.
(B) They are binding only for nations exporting agricultural products.
(C) They are mandatory only for member states of the European Union.
(D) They are voluntary reference texts for developing national legislation.

17. Match the Codex texts in List I with their appropriate descriptions in List II and select the correct option:
List I: (Codex Texts)
P. Codex Commodity Standards
Q. General Standards
R. Codes of Practice
S. Guidelines
List II: (Descriptions)
I. Principles for risk analysis and labeling rules
II. Specific parameters for a single product like canned tuna
III. Broad parameters applying universally, such as food additives
IV. Advisory texts on hygienic production and handling
(A) P-II, Q-III, R-IV, S-I
(B) P-III, Q-II, R-I, S-IV
(C) P-IV, Q-I, R-II, S-III
(D) P-II, Q-IV, R-III, S-I

18. Which statement correctly identifies the application of Codex Codes of Practice?
(A) They establish the maximum residue limits for agricultural pesticides.
(B) They mandate specific packaging dimensions for international shipping.
(C) They provide hygienic and processing best practices to ensure food safety.
(D) They outline the toxicological profiles of unapproved synthetic colors.

19. How does Codex define a "Processing Aid" as opposed to a food additive?
(A) A substance used during processing that may leave residues but has no ongoing function in the final food.
(B) A chemical compound added to a food product that actively retains its technological function in the final food.
(C) An organic or inorganic chemical contaminant introduced accidentally into food through poor agricultural practices.
(D) A natural or synthetic flavoring agent that significantly alters the dietary and nutritional profile of the food.

20. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): National governments often harmonize their domestic food safety regulations with Codex Standards.
Reason (R): The WTO SPS Agreement presumes that national measures based on Codex standards are scientifically justified and compliant with international trade rules.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

21. Identify the incorrect statement regarding Codex General Standards.
(A) They apply to all foods or broad categories of foods.
(B) They supersede horizontal regulations set by national authorities upon publication.
(C) The General Standard for Food Additives (GSFA) is an example of a general standard.
(D) They address cross-cutting issues such as labeling and contaminants.

22. In the following question, consider the two given statements:

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7. In the following question, consider the two given statements:
Statement I: The Codex Secretariat is strictly funded by mandatory financial contributions from the World Trade Organization (WTO).
Statement II: The Secretariat is responsible for preparing working documents, reports, and organizing sessions of the Commission.
Which of the following is correct?
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

8. Consider the following statements regarding the structure of the Codex Alimentarius Commission:
I. The Commission meets annually to adopt standards.
II. Regional Coordinating Committees address problems specific to geographic regions.
III. Task Forces are permanent subsidiary bodies established to handle continuous long-term standard development.
IV. General Subject Committees deal with matters applicable to all foods, such as hygiene and additives.
Which of the above statements are correct?
(A) I, II, and IV
(B) I, II, and III
(C) II, III, and IV
(D) I, III, and IV

9. Which of the following is not recognized as an official working language of the Codex Alimentarius Commission?
(A) Arabic
(B) German
(C) Russian
(D) Chinese

10. Identify the correctly matched pair regarding the Codex organizational structure.
(A) FAO Headquarters - Geneva, Switzerland
(B) Codex Secretariat - Rome, Italy
(C) World Health Organization - Paris, France
(D) World Trade Organization - Rome, Italy

11. Arrange the following historical milestones in the establishment of the Codex Alimentarius Commission in the correct chronological sequence:
1. First session of the Codex Alimentarius Commission held in Rome.
2. WHO World Health Assembly approved the establishment of the Joint FAO/WHO Food Standards Programme.
3. FAO Conference passed a resolution to establish the Codex Alimentarius Commission.
4. Joint FAO/WHO Conference on Food Standards requested the creation of a joint program.
(A) 3, 4, 2, 1
(B) 1, 3, 2, 4
(C) 4, 3, 1, 2
(D) 2, 4, 3, 1

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12. Identify the incorrectly matched pair regarding the types of Codex Subsidiary Bodies.
(A) Codex Committee on Food Additives - Permanent General Subject Committee
(B) Codex Committee on Fresh Fruits and Vegetables - Specific Commodity Committee
(C) Ad hoc Task Force on Antimicrobial Resistance - Permanent Committee
(D) FAO/WHO Coordinating Committee for Asia - Regional Coordinating Committee

13. What is the primary cause for the World Trade Organization (WTO) formally recognizing Codex standards under the SPS Agreement?
(A) To penalize developing nations by imposing higher customs tariffs on food imports.
(B) To establish a singular global authority that replaces national food regulations.
(C) To reallocate the burden of proof for contamination from industry to consumers.
(D) To provide a science-based benchmark preventing non-tariff trade barriers.

14. As a Food Safety Officer representing your country at a Codex meeting, which principle must you prioritize when proposing a new food safety standard?
(A) Enhancing the export profitability of domestic manufacturers.
(B) Aligning the standard with the cultural preferences of the host country.
(C) Ensuring the standard is based on sound scientific risk assessment.
(D) Bypassing the 8-step process to achieve faster international harmonization.

strict international standards and boost global competitiveness.

115. (A) Spices Board
The Spices Board of India is the statutory body responsible for monitoring the quality and safety of exported spices. If a shipment is suspected of containing illegal colorants or chemical residues, the board intervenes to draw and test samples. This pre-shipment testing ensures that exports comply with the strict regulations of importing countries.

116. (C) Promotional activity - Financial aid for tea garden replantation
The Tea Board of India is a statutory body established to support and develop the tea industry. Among its promotional activities, the board provides financial aid and subsidies for tea garden replantation to replace aging bushes and improve productivity. It also operates an electronic auction system, and its central headquarters is located in Kolkata.

117. (A) It protects regional coffees like 'Monsooned Malabar' to command premium prices.
The Coffee Board of India utilizes Geographical Indications to protect and promote unique regional coffee varieties, such as Monsooned Malabar. This legal framework certifies that the coffee possesses specific qualities due to its geographical origin. Protecting these unique names prevents imitation, builds brand equity, and allows producers to command premium prices in international markets.

118. (D) It certifies that the product meets the Indian Standard set by BIS.
The ISI mark is the official standard certification mark issued by the Bureau of Indian Standards in India. When applied to processed food products, it certifies that the item has been manufactured in conformity with the relevant Indian Standard. This mark provides assurance to consumers that the product has undergone quality control and testing.

119. (B) Scope of AGMARK - Strictly limited to marine and fishery products
AGMARK is a quality certification mark administered by the Directorate of Marketing and Inspection, utilizing the Central AGMARK Laboratory in Nagpur for testing. Its scope covers primary and semi-processed agricultural products, including edible oils, spices, and pulses. It is not limited to marine products, which are managed by a separate export promotion authority.

120. (C) Being accredited by NABL as per ISO/IEC 17025.
The most reliable indicator of a food testing laboratory's technical competence is formal accreditation by the National Accreditation Board for Testing and Calibration Laboratories. This accreditation is granted based on the international standard ISO/IEC 17025. It certifies that the laboratory possesses competent personnel, calibrated equipment, and robust quality management systems to perform analyses.

121. (D) Ministry of Commerce and Industry
The Marine Products Export Development Authority is a statutory body established to promote the export of marine products from India. To align its developmental and marketing activities with international trade policies, the authority functions under the administrative control of the Ministry of Commerce and Industry, rather than agricultural or fisheries ministries.

122. (A) Both A and R are true and R is the correct explanation of A.
The Export Inspection Council can grant self-certification status to established exporters of agricultural and food products. Exporters who demonstrate robust, compliant in-house quality management systems are trusted to self-certify their consignments. This facility reduces regulatory bottlenecks and simplifies export procedures, while maintaining high international standards of quality assurance.

123. (B) The government can use it to control distribution and prices of vital foods.
During a national crisis, shortage, or emergency, the Essential Commodities Act provides the government with statutory powers to intervene in the market. The government can use this legislation to regulate the production, supply, and distribution of vital food items. This action prevents speculative hoarding, stabilizes prices, and ensures equitable availability.

124. (B) 1, 2, and 4
The Consumer Protection Act of 2019 modernized consumer dispute redressal. It brought e-commerce platforms under its scope, allowed consumers to file complaints electronically, and introduced

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Statement I: Codex Guidelines are generally developed to provide advice on subjects like risk assessment methodologies and principles of food hygiene.
Statement II: Codex Commodity Standards prescribe specific quality and safety metrics exclusively for raw, unprocessed agricultural commodities.
Which of the following is correct?
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

23. Consider the following characteristics of Codex Codes of Practice:
I. They outline essential hygiene principles throughout the food chain.
II. They include the Hazard Analysis and Critical Control Point (HACCP) system principles.
III. They establish legally binding tariffs for non-compliant foods.
IV. They are adaptable to different national contexts and processing facilities.
Which of the above statements are correct?
(A) I, II, and III
(B) I, II, and IV
(C) II, III, and IV
(D) I, III, and IV

24. Which of the following is not considered an official category of Codex texts?
(A) Mandatory Trade Tariffs
(B) Maximum Residue Limits (MRLs)
(C) Guidelines
(D) Codes of Practice

25. Identify the correctly matched pair regarding a Codex text and its type.
(A) Principles for Food Import and Export Certification - Commodity Standard
(B) General Principles of Food Hygiene (CXC 1-1969) - Code of Practice
(C) Standard for Infant Formula - Guideline
(D) Maximum Residue Limits for Pesticides - Code of Practice

26. Arrange the following considerations in the correct sequence as prioritized by the Executive Committee when reviewing proposals for new work (Project Documents):
1. Amenability of the commodity to standardization.
2. Volume of production and consumption.
3. Consumer protection from the point of view of health.
4. Protection against fraudulent practices.
(A) 3, 4, 2, 1
(B) 1, 2, 3, 4
(C) 2, 3, 1, 4
(D) 4, 1, 3, 2

27. Identify the incorrectly matched pair regarding Codex standard classification.
(A) Advisory Text - Legally enforceable international treaty
(B) Vertical Standard - Applies to a specific food product
(C) Horizontal Standard - Applies across multiple food categories
(D) Regional Standard - Applies primarily to a specific geographic area

28. What is the intended effect of implementing the Codex Recommended International Code of Practice?
(A) To completely eliminate all naturally occurring microbial pathogens from the environment.
(B) To standardize the specific sensory properties and ingredients of cultural foods worldwide.
(C) To reduce foodborne illness risks through a framework of Good Hygiene Practices.
(D) To restrict competitive international agricultural trade to highly developed nations only.

29. A Food Safety Officer is tasked with developing a national regulation for maximum limits of lead in cereal grains. Which Codex document is most appropriate to consult?
(A) Codex Procedural Manual governing organizational and administrative processes
(B) Guidelines on Nutrition Labelling for prepackaged consumer food products
(C) General Standard for Food Additives regulating technical use levels
(D) General Standard for Contaminants and Toxins in Food and Feed (CXS 193-1995)

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safety thresholds for contaminants
(D) PTWI - Provisional Temporary Working Index used for evaluating toxic metals

88. What is the fundamental cause for JECFA replacing the NOAEL approach with the Benchmark Dose (BMD) approach in certain modern risk assessments, particularly for contaminants?
(A) The BMD approach models the entire dose-response curve rather than relying on a single experimental dose.
(B) The BMD approach drastically reduces the total number of animal test subjects required for chronic studies.
(C) The BMD approach is explicitly mandated by global WTO sanitary agreements to settle international trade disputes.
(D) The legacy NOAEL approach has been scientifically declared invalid for evaluating food additives under any criteria.

89. As a regulator reviewing JECFA monographs, you note that an additive is assigned an "ADI Not Specified". What competency-based conclusion should you draw?
(A) The additive must be immediately banned from use due to extreme chronic oral toxicity.
(B) The additive is safe under GMP because of very low toxicity and safe exposure levels.
(C) The additive requires further toxicological testing before any safe use is permitted.
(D) The chemical substance is currently pending a temporary maximum residue limit review.

90. Which of the following most appropriately describes the primary purpose of the specifications developed by JECFA for food additives?
(A) To officially dictate and control the retail market prices at which food additives are globally sold.
(B) To ensure commercial additives match the identity and purity of the toxicologically tested substance.
(C) To outline and standardize exact recipes and formulation steps for food products using the additive.
(D) To provide certified structural and functional health claims for marketing by food manufacturing firms.

91. What does the acronym ARfD stand for in the context of JECFA and JMPR evaluations?
(A) Acute Reference Dose
(B) Acceptable Residual Food Dose
(C) Annual Risk Factor Data
(D) Authorized Residue for Drugs

92. Match the terms related to veterinary drug residues in List I with their definitions in List II and select the correct option:
List I: (Terms Related to Veterinary Drug Residues)
P. MRL
Q. ARfD
R. Marker Residue
S. Target Tissue
List II: (Definitions)
I. The specific tissue from which the residue level is monitored
II. An estimate of the amount of a substance that can be ingested in a period of 24 hours or less without appreciable health risk
III. The parent drug or a metabolite whose concentration reflects the total residue in the target tissue
IV. The maximum concentration of residue resulting from the use of a veterinary drug recommended by Codex to be legally permitted in food
(A) P-II, Q-IV, R-I, S-III
(B) P-IV, Q-III, R-II, S-I
(C) P-IV, Q-II, R-III, S-I
(D) P-III, Q-I, R-IV, S-II

93. Which statement correctly distinguishes the evaluation of veterinary drug residues from pesticide residues by expert committees?
(A) Veterinary drug residues are evaluated by JMPR, whereas agricultural pesticides are assessed by JECFA.
(B) Veterinary drug MRLs apply exclusively to plants, whereas pesticide residue MRLs apply to animal products.
(C) Veterinary drugs do not require establishing an ADI, whereas all agricultural pesticides must have one.
(D) Veterinary drugs require animal pharmacokinetic studies to determine safety withdrawal periods.

94. How does JECFA define the Maximum Residue Limit (MRL) for veterinary drugs?
(A) The total cumulative amount of veterinary drug administered to a food animal over its entire lifetime.

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on global literature.

37. In the following question, consider the two given statements:
Statement I: At Step 8, the draft standard is submitted to the Commission for final adoption.
Statement II: Once adopted at Step 8, the standard is immediately enforceable by the international police force (INTERPOL).
Which of the following is correct?
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

38. Consider the following statements about the rounds of commenting in the Codex 8-step process:
I. Step 3 involves the first circulation of the proposed draft for comments.
II. Step 4 involves a subsidiary committee reviewing the comments received at Step 3.
III. Step 6 involves a second round of circulation for comments on the draft standard.
IV. Step 7 involves the final adoption of the standard by the World Trade Organization.
Which of the above statements are correct?
(A) I, II, and IV
(B) I, II, and III
(C) II, III, and IV
(D) I, III, and IV

39. Which of the following is not an authorized mechanism within the Codex standard-setting framework?
(A) Critical review by the Executive Committee
(B) Accelerated standard-setting procedure
(C) Formation of electronic working groups (eWGs) for drafting
(D) Independent unilateral revision by the Codex Secretariat

40. Identify the correctly matched pair representing a Step in the Codex procedure and its primary action.
(A) Step 4 - Consideration of comments by the relevant Codex Committee
(B) Step 1 - Final publication in the Codex Alimentarius
(C) Step 5 - Circulation of the draft standard for final member voting
(D) Step 8 - Preparation of the initial Project Document

41. Arrange the first five steps of the Codex standard-setting procedure in the correct sequence:
1. Consideration of the proposed draft and comments by the relevant committee (Step 4).
2. Preparation of a proposed draft text (Step 2).
3. Decision to undertake new work based on a project document (Step 1).
4. Adoption of the proposed draft text as a draft standard by the Commission (Step 5).
5. Circulation of the proposed draft for comments to member governments (Step 3).
(A) 3, 2, 5, 1, 4
(B) 3, 5, 2, 1, 4
(C) 1, 2, 3, 4, 5
(D) 2, 3, 5, 4, 1

42. Identify the incorrectly matched pair regarding the body responsible for specific actions in the Codex standard-setting process.
(A) Step 1 Approval - Executive Committee or the Commission
(B) Step 5 Draft Standard Adoption - Subsidiary Committee
(C) Step 3 Comment Collection - The Codex Secretariat
(D) Step 8 Final Adoption - Codex Alimentarius Commission

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43. What is the primary cause for invoking the accelerated procedure (skipping steps 6 and 7) in Codex?
(A) To address urgent global food safety risks or when consensus is already robust.
(B) To intentionally bypass scientific risk assessments for controversial additives.
(C) To limit the ability of developing nations to comment on proposed standards.
(D) To significantly reduce the annual operational costs of the Secretariat.

44. A subsidiary committee has just reviewed the comments received on a proposed draft standard and amended the text accordingly. As an FSO tracking this standard, what is the immediate next step in the normal Codex procedure?
(A) The text is immediately published as an

official and finalized Codex standard.
(B) The text is sent to the World Trade Organization for regulatory trade approval.
(C) The text is sent to the Commission for adoption as a draft standard at Step 5.
(D) The text is returned to the original drafting country to restart at Step 1.

45. What is the most appropriate reason for implementing a two-round commenting system (Steps 3 and 6) in the Codex 8-step process?
(A) To delay the adoption of standards that might negatively impact global trade.
(B) To allow the Secretariat to translate documents into all working languages.
(C) To satisfy regulatory requirements of the European Union food authority.
(D) To ensure transparency, inclusiveness, and consensus among all member nations.

46. Which member country has historically hosted the Codex Committee on Food Additives (CCFA) since 2006?
(A) The Netherlands
(B) United States of America
(C) China
(D) Japan

47. Match the Codex General Subject Committees in List I with their respective host countries in List II and select the correct option:
List I: (Codex General Subject Committees)
P. CCFA (Food Additives)
Q. CCPR (Pesticide Residues)
R. CCCF (Contaminants in Foods)
S. CCFH (Food Hygiene)
List II: (Host Countries)
I. The Netherlands
II. China
III. United States of America
IV. China (Note: Both CCFA and CCPR are hosted by China)
(A) P-I, Q-II, R-III, S-IV
(B) P-II, Q-IV, R-I, S-III
(C) P-III, Q-I, R-IV, S-II
(D) P-IV, Q-III, R-II, S-I

48. Which of the following statements correctly identifies the core mandate of the Codex Committee on Pesticide Residues (CCPR)?
(A) It evaluates the ecological and environmental impacts of pesticide manufacturing.
(B) It registers and licenses new pesticide active ingredients for agricultural use.
(C) It sets safety reference limits like acceptable daily intake (ADI) independently.
(D) It establishes Maximum Residue Limits (MRLs) for pesticide residues in specific foods.

49. According to the framework used by the Codex Committee on Contaminants in Foods (CCCF), how is a "contaminant" distinctively defined?
(A) Any substance unintentionally present in food from production, processing, or environmental sources.
(B) Any substance intentionally added to food to achieve a specific technological purpose during manufacturing.
(C) Only pathogenic or spoilage micro-organisms that rapidly multiply in temperature-abused food products.
(D) Genetically modified biological organisms that are deliberately integrated into agricultural crops.

50. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): The CCCF relies heavily on the scientific advice provided by JECFA to establish Maximum Levels (MLs) for contaminants.
Reason (R): JECFA conducts independent toxicological risk assessments and exposure evaluations for environmental and industrial contaminants in food.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

51. Identify the incorrect statement regarding the mandate of the Codex Committee on Food Additives (CCFA).
(A) CCFA assigns Acceptable Daily Intakes (ADIs) through its own internal toxicological committee.
(B) CCFA establishes or endorses safe permitted maximum levels for individual food additives in food.
(C) CCFA prepares priority lists of food additives requiring safety risk assessment by JECFA experts.
(D) CCFA continuously manages and updates

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the comprehensive General Standard for Food Additives.

52. In the following question, consider the two given statements:
Statement I: CCPR drafts MRLs for pesticides based on the risk assessments conducted by the Joint FAO/WHO Meeting on Pesticide Residues (JMPR).
Statement II: CCPR recommends sampling and analysis methods for determining pesticide residues in food.
Which of the following is correct?
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

53. Consider the following functions attributed to Codex committees:
I. Preparing priority lists of food additives for JECFA evaluation.
II. Establishing maximum levels for heavy metals and mycotoxins.
III. Developing guidelines for the safe use of food additives.
IV. Endorsing specifications for the identity and purity of food additives.
Which of the above statements represent the responsibilities of the CCFA?
(A) I, II, and III
(B) I, III, and IV
(C) II, III, and IV
(D) I, II, and IV

54. Which of the following hazards does not fall within the standard scope of the Codex Committee on Contaminants in Foods (CCCF)?
(A) Aflatoxins in peanuts
(B) Lead and Cadmium in infant formulas
(C) Residues of permitted veterinary antibiotics in poultry
(D) Radionuclides in food following a nuclear emergency

55. Identify the correctly matched pair of a Codex Committee and its specific focus area.
(A) CCFA - Maximum levels for naturally occurring toxins
(B) CCCF - Maximum levels for processing aids
(C) CCFH - Specifications for food colors
(D) CCPR - Extraneous Maximum Residue Limits (EMRLs)

56. Arrange the following steps in the logical sequence of a food additive being adopted into the General Standard for Food Additives (GSFA):
1. CCFA proposes the additive for JECFA evaluation.
2. JECFA conducts a safety assessment and establishes an ADI.
3. The Commission adopts the provision into the GSFA.
4. CCFA develops and forwards a proposed draft provision to the CAC.
(A) 1, 2, 4, 3
(B) 2, 1, 3, 4
(C) 1, 4, 2, 3
(D) 4, 1, 2, 3

57. Identify the incorrectly matched pair regarding Codex Committee acronyms and their full titles.
(A) CCFICS - Codex Committee on Food Import and Export Certification Systems
(B) CCFL - Codex Committee on Food Legislation
(C) CCNFSDU - Codex Committee on Nutrition and Foods for Special Dietary Uses
(D) CCFH - Codex Committee on Food Hygiene

58. What is the primary reason the Codex Committee on Pesticide Residues (CCPR) establishes Extraneous Maximum Residue Limits (EMRLs)?
(A) To establish international regulations for specific pesticide formulations permitted in organic farming systems.
(B) To regulate legacy pesticide residues that persist in the environment despite no longer being authorized.
(C) To set maximum residue limits for agricultural pesticides applied post-harvest during storage and transit.
(D) To officially penalize and sanction countries that utilize unauthorized agricultural chemical ingredients.

59. As a Food Safety Officer examining imported apples for pesticide compliance, you find residues of a specific fungicide. To check if this complies with international norms, which specific Codex output should you consult?
(A) Codex Maximum Residue Limits (CXLs) for

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30. Which of the following best describes the core purpose of a Codex Commodity Standard?
(A) To provide scientific toxicological data and exposure models on newly discovered biological pathogens.
(B) To establish the acceptable daily intake limits for veterinary drugs used in food-producing animals.
(C) To define the quality, composition, and safety factors required to trade a specific product.
(D) To provide comprehensive guidelines for food safety inspectors conducting industrial factory audits.

31. In the standard 8-step Codex procedure, which body is responsible for officially approving the proposal for new work (Step 1)?
(A) The World Trade Organization sanitary committee
(B) The Codex Commission or its Executive Committee
(C) The Joint FAO/WHO Expert Committee on Food Additives
(D) The host country delegates of the proposing committee

32. Match the Steps in the Codex standard-setting process in List I with their corresponding actions in List II and select the correct option:
List I: (Steps)
P. Step 3
Q. Step 5
R. Step 6
S. Step 8
List II: (Actions)
I. Final adoption by the Codex Alimentarius Commission
II. Draft text is circulated to member countries for first round of comments
III. Draft text is adopted by the Commission as a draft standard
IV. Draft standard is circulated for a second round of comments
(A) P-III, Q-II, R-I, S-IV
(B) P-IV, Q-I, R-II, S-III
(C) P-II, Q-IV, R-III, S-I
(D) P-II, Q-III, R-IV, S-I

33. Which of the following statements correctly differentiates between the uniform 8-step procedure and the accelerated procedure in Codex?
(A) The accelerated procedure omits Steps 6 and 7, moving directly from Step 5 to Step 8.
(B) The accelerated procedure skips the risk assessment phase entirely.
(C) The accelerated procedure requires unanimous consent, while the 8-step requires a simple majority.
(D) The accelerated procedure is used only for defining administrative budgets.

34. How is a "Project Document" defined within the Codex standard-setting procedure?
(A) A technical report detailing toxicological evaluations of pesticides.
(B) The final published version of a Codex standard on the official website.
(C) A formal proposal submitted to justify the need for new standard work.
(D) An official trade complaint filed against a country for SPS violations.

35. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): Step 5 of the Codex standard-setting procedure is a critical juncture where the Commission must review and adopt the proposed draft text as a draft standard.
Reason (R): Step 5 provides an opportunity for the Commission to ensure the work is progressing appropriately and is aligned with the strategic plan before finalizing it.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

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36. Identify the incorrect statement regarding the responsibilities in the early steps (Steps 1 to 3) of the Codex standard-setting process.
(A) Step 1 involves the decision by the Commission or Executive Committee to undertake new work.
(B) Step 2 involves the preparation of a proposed draft text, usually by a host country or working group.
(C) Step 3 involves circulating the proposed draft to member countries and international organizations for comments.
(D) Step 2 involves the Codex Secretariat drafting the initial proposed standard based

Commodity Committees.
(C) CCFH performs quantitative microbiological risk assessments internally without independent experts.
(D) CCFH designs the General Principles of Food Hygiene and drafts international HACCP systems guidelines.

67. In the following question, consider the two given statements:
Statement I: The GSFA Preamble states that food additives should only be used when there is a technological need and their use does not mislead the consumer.
Statement II: The GSFA Preamble explicitly forbids the use of food colors under any circumstances to preserve the original appearance of food.
Which of the following is correct?
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

68. Consider the following general principles for the inclusion of a food additive in the GSFA:
I. It must present no acceptable risk to consumer health at the proposed use levels.
II. Its use must provide an advantage or benefit to the consumer.
III. It must serve a recognized technological function.
IV. It must be a naturally derived substance; synthetic compounds are categorically excluded.
Which of the above statements are correct?
(A) I, II, and III
(B) I, II, and IV
(C) II, III, and IV
(D) I, III, and IV

69. Which of the following is not classified as a recognized functional class of food additives within the GSFA?
(A) Flavor enhancer
(B) Macronutrient replacer
(C) Bulking agent
(D) Firming agent

70. Identify the correctly matched pair regarding the GSFA database features.
(A) Table 2 - Lists food categories with all their permitted additive provisions.
(B) Table 3 - Lists additives permitted in food generally under GMP requirements.
(C) Table 1 - Lists additives with permitted food categories and maximum levels.
(D) Annex A - Lists the food category system hierarchy and descriptor details.

71. Arrange the general steps a Food Safety Officer would take to verify if a specific additive (e.g., Sodium Benzoate) is permitted in a specific food (e.g., Mango Nectar) using the GSFA online database:
1. Determine the exact food category code for "Mango Nectar" in the GSFA Food Category System.
2. Search for the additive's specific provision under that specific food category code.
3. Identify the functional class and exact name/ INS number of the additive.
4. Verify if the level found in the product complies with the Maximum Level and any accompanying notes in the database.
(A) 3, 1, 2, 4
(B) 1, 2, 3, 4
(C) 3, 2, 1, 4
(D) 1, 3, 4, 2

72. Identify the incorrectly matched pair regarding the Food Category System (FCS) in the GSFA.
(A) Category 13.0 - Fresh meats, poultry, and game
(B) Category 01.0 - Dairy products and analogues
(C) Category 02.0 - Fats and oils, and fat emulsions
(D) Category 14.0 - Beverages, excluding dairy products

73. What is the practical consequence of a food additive being listed in the GSFA with a maximum level of "GMP" (Good Manufacturing Practice)?
(A) The additive can be used in unrestricted and unlimited quantities in any food formulation.
(B) The additive must be used at the minimum level necessary to achieve its technological effect.
(C) The additive is completely prohibited and banned from use across all general food

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Pesticides database
(B) General Standard for Food Additives (GSFA)
(C) Code of Hygienic Practice for Fresh Fruits and Vegetables
(D) JECFA monographs on veterinary drugs

60. Which statement most appropriately differentiates the regulatory scope of CCFA from that of CCCF?
(A) CCFA deals exclusively with synthetic chemical compounds, whereas CCCF focuses entirely on natural biological pathogens.
(B) CCFA applies solely to processed consumer food products, whereas CCCF regulates raw primary agricultural commodities.
(C) CCFA manages intentionally added technological substances, whereas CCCF manages unintended environmental or processing toxins.
(D) CCFA standard parameters are legally binding under international law, whereas CCCF guidelines remain purely advisory.

61. Which country acts as the host for the Codex Committee on Food Hygiene (CCFH)?
(A) Republic of France
(B) The United Kingdom
(C) Commonwealth of Australia
(D) United States of America

62. Match the GSFA functional classes in List I with their corresponding definitions in List II and select the correct option:
List I: (GSFA Functional Classes)
P. Emulsifier
Q. Preservative
R. Antioxidant
S. Sequestrant
List II: (Definitions)
I. Prolongs shelf life by protecting against deterioration caused by oxidation
II. Controls the chemical environment by binding metal ions
III. Prolongs shelf life by protecting against deterioration caused by microorganisms
IV. Forms or maintains a uniform mixture of two or more immiscible phases
(A) P-IV, Q-I, R-III, S-II
(B) P-III, Q-IV, R-II, S-I
(C) P-IV, Q-III, R-I, S-II
(D) P-II, Q-III, R-I, S-IV

63. Which of the following statements correctly describes the structural design of the General Standard for Food Additives (GSFA)?
(A) It lists permitted food additives solely in alphabetical order, completely ignoring specific food categories.
(B) It defines use conditions for permitted additives across foods using a hierarchical Food Category System.
(C) It exclusively provides provisions for additives that lack a formally established Acceptable Daily Intake.
(D) It incorporates international maximum limits for pesticide residues and heavy metals alongside additives.

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64. What does the term "CXL" specifically refer to within the Codex framework?
(A) Codex Extraneous Level for heavy metals and industrial environmental toxins
(B) Codex Maximum Purity Limit for chemical additives used during food processing
(C) Codex Maximum Permitted Irradiation Level for agricultural and grain foods
(D) Codex Maximum Residue Limit for agricultural pesticides or veterinary drugs

65. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): Only food additives that have been evaluated by JECFA and assigned an Acceptable Daily Intake (ADI) can be included in the GSFA.
Reason (R): The GSFA is designed to guarantee that the use of food additives is technologically justified and safe for human consumption based on independent risk assessment.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

66. Identify the incorrect statement regarding the responsibilities of the Codex Committee on Food Hygiene (CCFH).
(A) CCFH is responsible for developing basic provisions on food hygiene that are applicable to all foods.
(B) CCFH systematically reviews and endorses hygiene provisions proposed by Codex

Reason (R): The safety factor of 100 accounts for inter-species differences (extrapolating from animal to human) and intra-species differences (variability among humans).
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

81. Identify the incorrect statement regarding the mandate and outputs of JECFA.
(A) JECFA drafts legally binding international food standards that bypass the Codex process.
(B) JECFA performs toxicological evaluations of food additives, contaminants, and residues of veterinary drugs.
(C) JECFA develops specifications for the identity and purity of food additives.
(D) JECFA conducts dietary exposure assessments to determine human risk.

82. In the following question, consider the two given statements:
Statement I: JECFA may allocate a "Temporary ADI" when the available data are sufficient to conclude that use is safe over the short term, but further data are required to resolve specific uncertainties.
Statement II: An ADI "Not Specified" indicates that the substance is highly toxic and cannot be used safely in any food at any level.
Which of the following is correct?
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

83. Consider the following factors evaluated during the risk assessment of a food additive by JECFA:
I. Biochemical and metabolic studies in test animals
II. Short-term and long-term toxicity studies
III. Reproductive and developmental toxicity
IV. Market demand and economic viability of the additive
Which of the above factors are evaluated by JECFA?
(A) I, II, and IV
(B) I, III, and IV
(C) I, II, and III
(D) II, III, and IV

84. Which parameter is generally not considered by JECFA when establishing an ADI for a food additive?
(A) Genotoxicity and chemical carcinogenicity data
(B) Pharmacokinetic profiles of the test substance
(C) Average consumer dietary exposure estimates
(D) The geographical location of the producer plant

85. Identify the correctly matched pair regarding toxicological evaluations by JECFA.
(A) Carcinogenicity - Study of a chemical substance's potential to cause malignant tumor growth
(B) Pharmacokinetics - Study of substance absorption, distribution, metabolism, and excretion
(C) Teratogenicity - Study of a chemical's capacity to induce physical defects in active fetal development
(D) Genotoxicity - Study of a chemical's capability to cause direct mutations in cellular DNA structures

86. JECFA evaluates a new artificial sweetener. Toxicological studies reveal a No Observed Adverse Effect Level (NOAEL) of 500 mg/kg body weight/day in a chronic rodent study. Applying the standard default uncertainty factor of 100, what is the calculated Acceptable Daily Intake (ADI) for this sweetener?
Formula: $ADI = \frac{NOAEL}{UF}$
(A) 5 mg/kg bw/day
(B) 50 mg/kg bw/day
(C) 0.5 mg/kg bw/day
(D) 5000 mg/kg bw/day

87. Identify the incorrectly matched pair regarding terms used in hazard characterization by JECFA.
(A) NOAEL - No Observed Adverse Effect Level representing the highest safe dose
(B) LOAEL - Lowest Observed Adverse Effect Level representing the lowest toxic dose
(C) TDI - Tolerable Daily Intake used to set

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categories.
(D) The additive must only be produced and manufactured in pharmaceutical-grade GMP facilities.

74. You are verifying a food label that declares "Contains Preservative (INS 211)". To ensure Codex compliance, what competency must you apply?
(A) Consult JEMRA guidelines to verify if INS 211 is an internationally approved antimicrobial.
(B) Verify INS 211 in the GSFA database for permission and maximum limits in that category.
(C) Immediately reject the product because INS numbers are not recognized under Codex rules.
(D) Ensure the preservative is also registered as an active pesticide in the CXL database.

75. Which statement most appropriately captures the scope and application of the CCFH General Principles of Food Hygiene (CXC 1-1969)?
(A) It provides a food hygiene foundation from primary production to consumption, integrating HACCP principles.
(B) It applies strictly and exclusively to the hygienic slaughter and processing steps of red meat products.
(C) It serves as a quantitative database for determining acceptable microbiological limits in trade.
(D) It details the required chemical sanitizers and their exact dilutions for food plant cleaning.

76. In what year was the Joint FAO/WHO Expert Committee on Food Additives (JECFA) established?
(A) 1945
(B) 1956
(C) 1963
(D) 1995

77. Match the toxicological terms evaluated by JECFA in List I with their definitions in List II and select the correct option:
List I: (Toxicological Terms)
P. NOAEL
Q. ADI
R. BMDL
S. UF
List II: (Definitions)
I. Estimate of the amount of a substance in food that can be ingested daily over a lifetime without appreciable health risk
II. Highest tested dose at which no adverse health effects are observed
III. A factor used to extrapolate data from animals to humans and account for human variability
IV. Benchmark Dose Lower Confidence Limit, used as a point of departure in risk assessment
(A) P-I, Q-II, R-III, S-IV
(B) P-II, Q-IV, R-I, S-III
(C) P-III, Q-I, R-IV, S-II
(D) P-II, Q-I, R-IV, S-III

78. Which of the following statements correctly describes the operational nature of JECFA?
(A) JECFA is an intergovernmental negotiation body where all members represent their national governments.
(B) JECFA exclusively evaluates the commercial and economic impacts of food additives on global food trade.
(C) JECFA members are independent experts serving in their personal capacities, not representing governments.
(D) JECFA operates as a subsidiary body under the direct administrative control of the World Trade Organization.

79. How does JECFA formally define the Acceptable Daily Intake (ADI)?
(A) The absolute maximum amount of a chemical substance that can be consumed in a single meal without poisoning.
(B) An estimate of daily dietary intake over a lifetime without appreciable health risk to the consumer.
(C) The minimum amount of an additive required to successfully achieve its intended technological function.
(D) The average daily consumption of a specific food additive by the entire general consumer population.

80. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): JECFA typically applies a safety factor (uncertainty factor), usually 100, to the NOAEL to derive the ADI for human consumption.

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(B) The minimum active therapeutic dose of medicine required to successfully cure an infection in an animal.
(C) The highest concentration of drug residue legally permitted and recognized as safe in a food product.
(D) The specific chemical concentration of a drug that completely prevents microbial spoilage in stored meat.

95. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): JECFA establishes an Acute Reference Dose (ARfD) for certain veterinary drugs alongside the Acceptable Daily Intake (ADI).
Reason (R): Some veterinary drugs, like certain anthelmintics, may elicit adverse health effects after a single meal containing high levels of residues, necessitating acute exposure evaluation.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

96. Identify the incorrect statement regarding tissue withdrawal periods in veterinary medicine as evaluated by JECFA.
(A) The withdrawal period is the time required after the last administration of the drug for the residue to deplete to or below the MRL.
(B) Failure to adhere to the withdrawal period frequently results in residues exceeding the MRL.
(C) Depletion studies are critical for establishing appropriate withdrawal periods.
(D) JECFA sets mandatory withdrawal periods that must be universally applied exactly as stated, superseding national regulations.

97. In the following question, consider the two given statements:
Statement I: Muscle and liver are commonly designated as target tissues for monitoring veterinary drug residues in livestock.
Statement II: A marker residue is chosen because its concentration has a known relationship to the total residue of toxicological concern in the target tissue.
Which of the following is correct?
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

98. Consider the following elements evaluated by JECFA to recommend an MRL for a veterinary drug:
I. Toxicological evaluation to establish an ADI
II. Residue depletion studies in the target animal species
III. A validated analytical method for regulatory control of the marker residue
IV. Consumer dietary exposure assessment confirming intake does not exceed the ADI
Which of the above statements are correct?
(A) I, II, and III
(B) II, III, and IV
(C) I, II, III, and IV
(D) I, III, and IV

99. When evaluating antimicrobial veterinary drugs, which specific hazard is JECFA mandated to consider that is generally not applicable to non-antimicrobial additives?
(A) Human intestinal microbiome disruption and promotion of antimicrobial resistance.
(B) Induction of chronic organ tumor growth and genotoxic carcinogenicity.
(C) Severe liver tissue damage leading to acute or chronic hepatotoxicity.
(D) Allergic systemic reactions including contact and respiratory dermatitis.

100. Identify the correctly matched pair regarding JECFA veterinary drug assessment concepts.
(A) Total Residue - Only the parent compound present in the tissue
(B) Injection site - Typically evaluated only for aesthetic degradation
(C) ARfD - Applied to chronic lifetime exposure
(D) EDI - Estimated Daily Intake of residues by consumers

101. A new veterinary antibiotic has an Acceptable Daily Intake (ADI) of 10 micrograms/kg bw/day. For a 60 kg human, the safe daily intake is 600 micrograms. If the Estimated Daily Intake (EDI) based on proposed MRLs across

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(D) Risk Characterization

115. Identify the correctly matched pair of a pathogen and the primary food vehicle often evaluated by JEMRA.
(A) Enterobacter sakazakii (Cronobacter) - Powdered infant formula
(B) Vibrio parahaemolyticus - Unpasteurized soft raw milk cheese
(C) Listeria monocytogenes - Commercial dry roasted peanuts
(D) Campylobacter jejuni - Sterilized canned tuna products

116. A local risk manager wants to use a JEMRA risk model for Listeria monocytogenes in a new type of fermented sausage. The JEMRA model indicates that growth is suppressed at pH < 4.4 or water activity (a_w) < 0.92. If the new sausage has a pH of 4.8 and an a_w of 0.95, what is the correct conceptual application of the model?
(A) The physical parameters restrict pathogen growth, meaning no further chemical control is required.
(B) The product requires the immediate addition of clinical veterinary antibiotics to control pathogens.
(C) All pathogenic bacteria will die off rapidly in this food matrix, reducing the total risk to zero.
(D) The product supports growth, requiring a strict exposure assessment and risk management strategy.

117. Identify the incorrectly matched pair regarding a foodborne pathogen and a characteristic risk factor assessed by JEMRA.
(A) Salmonella - Pathogenic vertical transmission directly into shell eggs
(B) Cronobacter spp. - High thermal resistance surviving commercial canning
(C) Listeria monocytogenes - Biological ability to grow at refrigeration temperatures
(D) Campylobacter - Naturally high prevalence in poultry gastrointestinal tracts

118. What is the main cause for the high level of uncertainty typically present in the "Exposure Assessment" phase of a Microbiological Risk Assessment?
(A) The scientific lack of basic chemical and molecular formulas for various pathogenic bacterial cells.
(B) The continuous mutation of active bacterial strains into viral entities during human digestion.
(C) The difficulty in predicting varied consumer cooking and handling habits that alter microbial counts.
(D) The systematic refusal of commercial food manufacturing companies to share private monitoring data.

119. As an FSO investigating an outbreak linked to fresh leafy greens, you refer to Codex/JEMRA outputs. Which specific guidance document would be most competent to apply to prevent future occurrences?
(A) The GSFA chemical additive annex detailing maximum permissions for green vegetables
(B) The JMPR scientific monograph regarding herbicide residue levels on leafy crops
(C) The Codex general guidelines regulating the labeling of genetically modified foods
(D) JEMRA risk assessments and the CCFH Code of Hygienic Practice for Fresh Fruits

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120. Which of the following is the most appropriate description of a unique challenge in microbial risk characterization compared to chemical risk characterization?
(A) Microbes can multiply, cause infection from a single cell, and undergo secondary human transmission.
(B) Chemical toxins always cause acute foodborne illness, whereas microbes only trigger chronic diseases.
(C) Microbial colonies are always visible to the naked eye, which makes dietary exposure assessments easy.
(D) Chemical toxicological risk assessments do not require determining pathways of human exposure.

121. The Joint FAO/WHO Meeting on Pesticide Residues (JMPR) is an expert scientific body. In what year was it first established?
(A) 1945
(B) 1963
(C) 1985
(D) 1995

122. Match the terms associated with pesticide regulation in List I with their definitions in List II and select the correct option:
List I: (Terms)

in a given population
IV. Evaluating the nature of the adverse health effects, including dose-response relationships
(A) P-II, Q-IV, R-I, S-III
(B) P-I, Q-II, R-III, S-IV
(C) P-IV, Q-III, R-II, S-I
(D) P-II, Q-I, R-IV, S-III

108. Which statement correctly reflects the mandate and output of JEMRA?
(A) JEMRA establishes mandatory international microbiological criteria that completely bypass domestic laws.
(B) JEMRA conducts quantitative toxicological risk assessments of chemical sanitizers used in food plants.
(C) JEMRA conducts scientific risk assessments on pathogen-commodity pairings to support CCFH guidelines.
(D) JEMRA functions solely as an administrative reporting body that registers global foodborne outbreaks.

109. How is "Hazard Characterization" uniquely defined in the context of microbiological risk assessment by JEMRA?
(A) It relies solely on identifying the specific taxonomic genus and strain species of the target bacteria.
(B) It is the process of calculating the exact total monetary cost of a regional food disease outbreak.
(C) It simply involves counting the total colony-forming units of bacteria found on a sanitary food contact surface.
(D) It evaluates the nature of adverse health effects of biological agents, heavily using dose-response models.

110. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): Establishing a dose-response relationship for microbial pathogens is highly complex compared to chemical risk assessment.
Reason (R): Pathogens can multiply or die off in food matrices depending on environmental conditions, and infection depends heavily on host immune status and microbial strain virulence.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

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111. Identify the incorrect statement comparing JEMRA and CCFH.
(A) JEMRA conducts the risk assessment component of the risk analysis framework.
(B) JEMRA determines the Acceptable Level of Protection (ALOP) for member countries.
(C) CCFH conducts the risk management component of the risk analysis framework.
(D) CCFH develops Codes of Hygienic Practice based on JEMRA's scientific advice.

112. In the following question, consider the two given statements:
Statement I: Exposure assessment for microbes must account for changes in the microbial population during processing, storage, distribution, and preparation.
Statement II: Unlike chemicals, microbes remain at a static concentration from harvest to consumption.
Which of the following is correct?
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

113. Consider the following pathogen-commodity combinations:
I. Salmonella spp. in eggs and broiler chickens
II. Listeria monocytogenes in ready-to-eat foods
III. Campylobacter spp. in broiler chickens
IV. Lead and Cadmium in bivalve molluscs
Which of the above combinations have been evaluated by JEMRA to support Codex standards?
(A) I, II, and III
(B) II, III, and IV
(C) I, II, and IV
(D) I, III, and IV

114. Which of the following is not one of the four standard steps of a Codex Microbiological Risk Assessment?
(A) Hazard Identification
(B) Exposure Assessment
(C) Outbreak Litigation

ARfD)
II. Food consumption data (from GEMS/Food diets)
III. Residue levels found in food (STMR - Supervised Trials Median Residue)
IV. Global sales figures of the pesticide manufacturer

Which of the above components are essential for JMPR?
(A) I, II, and IV
(B) I, II, and III
(C) II, III, and IV
(D) I, III, and IV

129. Which of the following is not a recognized component of risk communication as outlined by Codex principles?
(A) Deliberately withholding scientific uncertainties from the public to prevent panic.
(B) Promoting the interactive exchange of information and opinions among risk assessors, risk managers, consumers, and other interested parties.
(C) Explaining risk assessment findings and the basis of risk management decisions.
(D) Fostering public understanding and acceptance of risk analysis processes.

130. Identify the correctly matched pair regarding the components of the Risk Analysis framework used in Codex.
(A) Risk Assessment - Developing national legislation and enforcing standards at borders
(B) Risk Management - Establishing Acceptable Daily Intake limits using toxicology trials
(C) Risk Communication - The interactive exchange of scientific risk data among stakeholders
(D) Risk Profiling - Conducting routine physical inspections of imported agricultural foods

131. If the Supervised Trials Median Residue (STMR) for a pesticide on apples is 0.5 mg/kg, and the average daily consumption (F) of apples in a specific diet is 0.1 kg/person/day, what is the estimated dietary intake from apples for that individual?
Calculation: Intake = STMR x F
(A) 0.05 mg/person/day
(B) 5.0 mg/person/day
(C) 0.5 mg/person/day
(D) 0.005 mg/person/day

132. Identify the incorrectly matched pair regarding models/terms used in JMPR dietary exposure assessment.
(A) TMDI - Theoretical Maximum Daily Intake (uses MRLs)
(B) IEDI - International Estimated Daily Intake (uses STMRs)
(C) IESTI - International Estimate of Short-Term Intake (uses ARfD)
(D) GEMS/Food - Global Database of Pesticide Manufacturing Plants

133. What is the primary positive effect of effective, interactive risk communication during the Codex standard-setting process?
(A) It ensures that the lowest possible safety standard is adopted to satisfy corporate industry.
(B) It builds trust and transparency, allowing managers to address concerns of all stakeholders.
(C) It completely replaces the need for conducting independent scientific food risk assessments.
(D) It guarantees that all sovereign nations will legally enforce the standard within one year.

134. A farmers' union protests that a new Codex MRL for their preferred pesticide is too low, claiming it is impossible to meet. As a competent FSO, how should you communicate the basis of this MRL?
(A) Explain that the MRL is an arbitrary numerical value chosen to restrict trade from developing nations.
(B) Assure them that Codex standards are completely voluntary and can be ignored for export activities.
(C) Explain the MRL is based on GAP data; exceeding it shows misuse but is not a direct health hazard.
(D) State that the limit represents the exact toxic threshold, and any residue above it causes death.

135. Which of the following is the most appropriate guiding principle for risk communication by Codex and international advisory bodies?
(A) Communication should be a simple one-way official broadcast of finalized administrative decisions.
(B) Communication must begin only after all

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P. JMPR
Q. CCPR
R. GAP
S. CXL

List II: (Definitions)

I. Good Agricultural Practice in the use of pesticides
II. Codex Maximum Residue Limit for a pesticide
III. The Codex committee that recommends MRLs based on expert advice
IV. The expert scientific group that conducts risk assessments for pesticides

(A) P-III, Q-IV, R-II, S-I
(B) P-IV, Q-III, R-I, S-II
(C) P-IV, Q-I, R-III, S-II
(D) P-I, Q-II, R-IV, S-III

123. Which statement correctly describes the core structure of the annual JMPR meetings?
(A) It comprises a WHO toxicology group and an FAO panel on residue chemistry and analytical methods.
(B) It consists of a singular specialized group of global trade economists evaluating pesticide pricing.
(C) It consists entirely of technical sales representatives from global pesticide manufacturing firms.
(D) It operates as an intergovernmental negotiation forum where member nations vote on chemical safety.

124. How is "Good Agricultural Practice (GAP) in the use of pesticides" defined in the context of setting MRLs?
(A) The minimum application of organic pesticides required to successfully achieve national certification.
(B) The absolute legislative prohibition of any synthetic chemical sprays during commercial farming practices.
(C) The nationally authorized safe pesticide applications under actual conditions for effective pest control.
(D) The commercial practice of applying maximum concentrated doses of synthetic pesticides just before harvest.

125. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): JMPR conducts dietary risk assessments to ensure that proposed MRLs do not result in intakes that exceed the ADI or ARfD.
Reason (R): An MRL reflects the maximum residue expected from GAP, but if the theoretical maximum daily intake calculated from these MRLs exceeds safe toxicological limits, JMPR will not recommend the MRL.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

126. Identify the incorrect statement regarding the process of establishing an MRL by JMPR.
(A) JMPR systematically reviews residue data from supervised field trials conducted according to approved GAP.
(B) The MRL is established at a level derived from highest residues found in valid supervised field trials.
(C) MRLs are based on toxicological limits rather than agricultural practice, making them direct safety limits.
(D) If estimated dietary exposure exceeds the ADI, an MRL is not recommended, regardless of GAP trials.

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127. In the following question, consider the two given statements:
Statement I: Supervised field trials must reflect the maximum application rate and minimum pre-harvest interval authorized under national GAP.
Statement II: Data from supervised trials are used to estimate the maximum residue levels that might occur in food entering trade.
Which of the following is correct?
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

128. Consider the following components evaluated during JMPR dietary exposure assessments for pesticides:
I. Toxicological reference values (ADI and

measures that provide a higher level of health protection than Codex standards if there is scientific justification.

Statement II: If a nation aligns its standards completely with Codex, those measures are presumed to be consistent with the provisions of the WTO SPS Agreement.

Which of the following is correct?

(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

143. Consider the following functions in relation to national standard setting:

I. Receiving Codex final texts and working documents.
II. Circulating Codex documents to concerned government departments and industry stakeholders.
III. Levying custom duties on imported food items.
IV. Coordinating India's participation in Codex meetings.

Which of the above are the primary functions of the National Codex Contact Point (NCCP) of India?

(A) I, II, and IV
(B) I, II, and III
(C) II, III, and IV
(D) I, III, and IV

144. Which of the following is not a recognized objective of harmonizing national food standards with Codex Alimentarius?

(A) Facilitating international trade by removing non-tariff barriers
(B) Ensuring protection of consumer health based on international scientific consensus
(C) Reducing the duplication of risk assessment efforts by national scientific bodies
(D) Promoting monopolies for multinational food corporations in developing countries

145. Identify the correctly matched pair representing an Indian regulatory body and its relationship to Codex.

(A) FSSAI - Hosts the National Codex Contact Point (NCCP)
(B) Spices Board of India - Evaluates veterinary drug residues globally
(C) ICMR - Drafts international standards for the CCFA
(D) BIS - Enforces mandatory adoption of all Codex guidelines

146. As an FSSAI official tasked with drafting a new national standard for a food additive not currently used in India, which conceptual approach aligns best with harmonization principles?

(A) Ban the chemical additive outright from domestic use to maintain an overly cautious safety strategy.
(B) Adopt the regulatory standard only if local food manufacturers formally agree to establish a cartel.
(C) Adopt the standard if the GSFA has a provision fitting the local dietary context after JECFA evaluation.
(D) Conduct an independent 10-year animal toxicity study before considering existing scientific GSFA data.

147. Identify the incorrectly matched pair regarding the international framework of food safety.

(A) WTO SPS - Sets the quantitative MRLs for heavy metals in food
(B) FAO - Focuses on agricultural production and food security
(C) WHO - Focuses on public health and disease prevention
(D) CAC - Coordinates food standard-setting activities internationally

148. What is the cause-and-effect relationship regarding the "presumption of conformity" under the WTO SPS Agreement?

(A) Because a country exports food products, it must automatically conform to all voluntary Codex texts.
(B) Because a country adopts a strict national standard, it is automatically presumed to conform to Codex.
(C) Because Codex standards are voluntary, the WTO automatically presumes them to be trade irrelevant.
(D) Because a country adopts a Codex standard, it is presumed compliant and unlikely to be challenged.

149. You are investigating a trade dispute where a shipment of Indian spices is rejected by a foreign

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regulatory risk management decisions are fully implemented.
(C) Communication should prioritize protecting commercial host country interests over general public health.
(D) Communication must be interactive, starting early to ensure transparency and scientific integrity.

136. In India, which regulatory body functions as the National Codex Contact Point (NCCP)?
(A) Food Safety and Standards Authority of India (FSSAI)
(B) Bureau of Indian Standards (BIS)
(C) Agricultural and Processed Food Products Export Development Authority (APEDA)
(D) Ministry of Commerce and Industry

137. Match the Indian Codex frameworks in List I with their corresponding functions in List II and select the correct option:
List I: (Indian Codex Frameworks)
P. NCCP India
Q. National Codex Committee (NCC)
R. Shadow Committees
S. FSSAI
List II: (Functions)
I. Coordinates and formulates India's national response to specific Codex committees
II. Serves as the nodal agency for all Codex matters in India
III. Advises the NCCP on broader policy matters and strategic positions for Codex
IV. Hosts the NCCP and aligns domestic standards with Codex
(A) P-I, Q-II, R-III, S-IV
(B) P-II, Q-III, R-I, S-IV
(C) P-IV, Q-I, R-II, S-III
(D) P-III, Q-IV, R-I, S-II

138. Which statement correctly describes the relationship between India's national food standards (under the Food Safety and Standards Regulations - FSSR) and Codex standards?
(A) Indian standards completely ignore Codex texts to protect domestic agricultural processing industries.
(B) India harmonizes national standards with Codex where feasible and scientifically justified locally.
(C) FSSAI mandates that Codex standards apply solely to imported food rather than domestic food products.
(D) FSSAI must adopt every single international Codex standard verbatim without any national modifications.

139. How is the process of "Harmonisation" practically defined in the context of national and international food standards?
(A) The alignment of national technical regulations and standards with relevant international standards.
(B) The culinary process of standardizing sensory profiles of traditional ethnic foods on a global scale.
(C) The political and administrative merger of the FAO and WHO into a single unified governing entity.
(D) The absolute legislative elimination of all agricultural trade tariffs on food products globally.

140. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): FSSAI constitutes specific "Shadow Committees" that correspond to relevant Codex Committees.
Reason (R): Shadow Committees are tasked with analyzing Codex working documents, consulting national stakeholders, and drafting India's official technical positions for Codex meetings.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

141. Identify the incorrect statement regarding the WTO SPS Agreement and Codex standards.
(A) The SPS Agreement recognizes Codex standards as the benchmark for food safety.
(B) National standards that are stricter than Codex require scientific justification (risk assessment).
(C) Harmonizing with Codex helps a country avoid trade disputes at the WTO.
(D) A country is forbidden from having a standard stricter than Codex under any circumstance.

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142. In the following question, consider the two given statements:
Statement I: A nation may establish food safety

ANSWERS

1. (C) 1963
The Codex Alimentarius Commission was established in 1963 during the first session of the Joint Food and Agriculture Organization and World Health Organization Food Standards Conference. This intergovernmental body was created to protect consumer health and ensure fair practices in international food trade through the development of harmonized global food safety and quality standards.

2. (C) P-II, Q-IV, R-I, S-III
The Codex Alimentarius Commission acts as the supreme decision-making body that adopts food standards. The Executive Committee manages standard-setting activities, while the Codex Secretariat coordinates meetings and handles administrative tasks. Subsidiary bodies, including commodity and general subject committees, draft the technical standards and guidelines, establishing a structured hierarchy for global food safety regulation.

3. (A) It consists of the Chairperson, Vice-Chairpersons, and six regional coordinators.
The Executive Committee of the Codex Alimentarius Commission consists of the Chairperson, three Vice-Chairpersons, and six regional coordinators representing different geographic regions. This composition ensures diverse international representation when managing standard-setting activities, reviewing proposals for new work, and overseeing the strategic direction and operational efficiency of the joint food standards program.

4. (D) A collection of internationally adopted food standards and related guidelines.
The term Codex Alimentarius translates from Latin as the Food Code and represents a comprehensive collection of internationally adopted food standards, guidelines, and codes of practice. These resources aim to protect public health globally, ensure fair practices in international agricultural trade, and guide national legislative efforts in establishing harmonized and scientifically sound food safety regulations.

5. (B) Both A and R are true but R is not the correct explanation of A.
The Codex Alimentarius Commission operates as an intergovernmental body jointly managed by the Food and Agriculture Organization and the World Health Organization. While its dual mandate focuses on consumer health protection and fair trade practices, this mandate describes its primary operational objectives rather than explaining why it was structurally organized under these parent United Nations agencies.

6. (C) International non-governmental organizations (NGOs) can participate as members with full voting rights.
Membership in the Codex Alimentarius Commission is strictly open to member nations and associate members of the Food and Agriculture Organization and the World Health Organization. International non-governmental organizations and other specialized agencies can participate solely as observers, meaning they can attend meetings and contribute technical expertise but do not possess any official voting rights.

7. (D) Statement I is incorrect and Statement II is correct.
The Codex Secretariat is located at the Food and Agriculture Organization headquarters in Rome and is funded jointly by the Food and Agriculture Organization and the World Health Organization, not the World Trade Organization. The Secretariat carries out essential administrative tasks, including preparing working documents, publishing official reports, and organizing annual commission and subsidiary committee sessions.

8. (A) I, II, and IV
The Commission meets annually to review and adopt standards, utilizing general subject committees for broad issues like hygiene and additives. Regional coordinating committees address geographical concerns, while task forces are temporary ad hoc bodies created for specific short-term projects. This flexible organizational structure enables the commission to effectively develop comprehensive global food standards and safety guidelines.

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country due to pesticide residues. The residue is below the Codex MRL but exceeds the importing country's stricter national MRL. Using your competency in international food law, what is the regulatory reality of this situation?

(A) The importing country must accept the spice shipment because all Codex MRLs act as absolute mandates.

(B) The importing country can enforce a stricter limit if it is scientifically justified by a risk assessment.

(C) India can immediately impose reciprocal economic and military trade sanctions under standard FAO rules.

(D) The rejected shipment must be automatically seized and destroyed by visiting JMPR field officials.

150. What is the most appropriate description of the ultimate global goal of harmonizing national standards with the Codex Alimentarius?

(A) To ensure that exactly identical recipes are used for foods globally, eliminating cultural diversity.

(B) To establish a dual trading system where developed countries receive safer products than poor nations.

(C) To create a level trade playing field while ensuring a high level of consumer health protection.

(D) To transfer all national sovereign legislative powers regarding food directly to the United Nations.

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various tissues (muscle, liver, kidney, fat) totals 750 micrograms, what is the correct conceptual application by JECFA?
(A) JECFA will recommend the MRLs because antibiotics degrade rapidly during cooking processes.
(B) JECFA will not recommend the proposed MRLs because the calculated EDI exceeds the safe ADI.
(C) JECFA will artificially increase the ADI to 15 micrograms/kg bw/day to accommodate the residues.
(D) JECFA will permanently ban the veterinary drug outright without conducting further review.

102. Identify the incorrectly matched pair regarding the outputs of JECFA for veterinary drugs.
(A) Toxicological monograph - Details hazard identification and characterization
(B) Residue monograph - Details depletion studies and analytical methods
(C) Marker residue - The visual bruising left on animal tissue post-injection
(D) Recommended MRL - Proposed maximum limit for consideration by Codex

103. What is the primary cause for calculating both an ADI and an ARfD for certain pharmacologically active substances in food-producing animals?
(A) ADI is applied exclusively for bovine veterinary drugs, whereas ARfD is used solely for poultry medication.
(B) ADI measures indirect environmental chemical toxicity, while ARfD measures direct human physiological toxicity.
(C) ADI is mandated by WHO expert panels, whereas ARfD is required by FAO agricultural experts independently.
(D) ADI protects against long-term chronic exposure, while ARfD protects against single-event acute toxicity.

104. As an FSO, you receive a lab report showing a veterinary drug residue exactly at the Codex MRL in a batch of imported milk. What competency-based conclusion should you draw regarding consumer safety?
(A) The milk is safe because life-long exposure at the MRL will not exceed the toxicological ADI.
(B) The milk is hazardous because any detectable chemical residue indicates systemic safety failure.
(C) The milk must be systematically diluted with residue-free milk before commercial public sale.
(D) The milk is safe for consumption only if consumed by healthy adults and not young children.

105. What is the most appropriate reason JECFA designates a "marker residue" for regulatory monitoring instead of requiring analysis of the total residue?
(A) Total residues of veterinary medications are biochemically degraded and never toxic to humans.
(B) Measuring total residues is highly complex, expensive, and impractical for routine screening.
(C) Marker residues are identified as the only active components causing antimicrobial resistance.
(D) The World Trade Organization explicitly forbids member states from measuring total residues.

106. The Joint FAO/WHO Expert Meetings on Microbiological Risk Assessment (JEMRA) was established in response to the needs of which Codex Committee?
(A) Codex Committee on Food Additives (CCFA)
(B) Codex Committee on Food Hygiene (CCFH)
(C) Codex Committee on Pesticide Residues (CCPR)
(D) Codex Committee on Nutrition and Foods for Special Dietary Uses (CCNFSDU)

107. Match the steps of Quantitative Microbiological Risk Assessment (QMRA) defined by Codex/ JEMRA in List I with their descriptions in List II and select the correct option:
List I: (Steps of QMRA)
P. Hazard Identification
Q. Hazard Characterization
R. Exposure Assessment
S. Risk Characterization
List II: (Descriptions)
I. Evaluating the degree of human exposure to the pathogen via food
II. Identifying the biological agents capable of causing adverse health effects
III. Estimating the probability of occurrence and severity of known adverse health effects

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9. (B) German
The official working languages of the Codex Alimentarius Commission are English, French, Spanish, Arabic, Chinese, and Russian. All official documents, reports, draft standards, and plenary sessions are translated and conducted in these six languages to ensure broad global participation. German is not recognized as an official working language of the commission.

10. (B) Codex Secretariat - Rome, Italy
The Codex Secretariat is housed within the headquarters of the Food and Agriculture Organization in Rome, Italy. In contrast, the World Health Organization is headquartered in Geneva, Switzerland, and the World Trade Organization is also based in Geneva. Understanding these administrative locations is essential for navigating the international food safety and trade policy landscape.

11. (A) 3, 4, 2, 1
The historical establishment of the joint program began when the Food and Agriculture Organization Conference approved standard-setting in nineteen sixty-one. Following this, the joint conference requested program creation, leading to approval by the World Health Assembly in nineteen sixty-three. This developmental timeline culminated in the inaugural session of the Codex Alimentarius Commission in Rome.

12. (C) Ad hoc Task Force on Antimicrobial Resistance - Permanent Committee
Ad hoc intergovernmental task forces established by the Codex Alimentarius Commission are temporary bodies designed to address specific, urgent issues within a defined timeframe. They are not permanent committees like those governing general food hygiene or pesticide residues. Once their targeted tasks and outputs are completed and adopted, these specialized task forces are formally dissolved.

13. (D) To provide a science-based benchmark preventing non-tariff trade barriers.
The World Trade Organization recognizes Codex standards under the Sanitary and Phytosanitary Agreement to provide a scientific benchmark for food safety. This recognition ensures that national regulations do not act as arbitrary, non-tariff trade barriers. Aligning national measures with Codex standards helps settle international trade disputes by offering a legally recognized, science-based reference framework.

14. (C) Ensuring the standard is based on sound scientific risk assessment.
When proposing a new food safety standard, representatives must prioritize sound scientific risk assessment over commercial or political interests. Codex standards are built on independent scientific advice provided by expert panels. This focus ensures that adopted measures are objective, protect public health, and withstand trade scrutiny under international frameworks like the World Trade Organization.

15. (B) Standards set specific quantitative limits, whereas Guidelines provide general policy frameworks.
Codex standards provide specific quantitative criteria and quality metrics for individual commodities or horizontal safety topics. In contrast, guidelines offer broader operational and policy frameworks, outlining general principles for food control systems, import-export inspections, and consumer labeling. Both text categories serve as voluntary references, assisting governments in designing effective national food control regulations.

16. (D) They are voluntary reference texts for developing national legislation.
Codex standards, guidelines, and codes of practice are entirely voluntary reference texts. They do not possess direct, legally binding force within member countries upon commission adoption. Instead, individual national governments must formally choose to incorporate or adapt these international recommendations into their own domestic food safety and agricultural trade legislative frameworks.

17. (A) P-II, Q-III, R-IV, S-I
Codex commodity standards prescribe parameters for specific products. General standards apply universally to issues like food additives. Codes of practice offer advisory text regarding hygienic processing, and guidelines detail operational principles such as labeling rules. This organized division of regulatory publications ensures that national food control authorities can easily access relevant technical safety recommendations.

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36. (D) Step 2 involves the Codex Secretariat drafting the initial proposed standard based on global literature.
During the initial stages of standard development, the relevant subsidiary committee, an electronic working group, or a designated member country is responsible for drafting the proposed draft text at Step Two. The Codex Secretariat does not unilaterally draft standards based on literature reviews; instead, it coordinates administrative tasks, coordinates translation services, and circulates documents for review.

37. (C) Statement I is correct and Statement II is incorrect.
At Step Eight, the draft text is submitted to the Commission for final adoption as an official Codex standard. Once adopted, however, the standard is not legally enforceable by any international agency. It remains a voluntary reference text, and individual member countries must independently choose whether to incorporate these guidelines into their domestic national laws.

38. (B) I, II, and III
The Codex eight-step process includes two distinct rounds of commenting. Step Three involves circulating the initial proposed draft, which is then reviewed by the relevant committee at Step Four. Step Six involves circulating the draft standard for a second round of comments. Step Eight represents the final adoption by the Commission, not the World Trade Organization.

39. (D) Independent unilateral revision by the Codex Secretariat
Standard-setting relies on a transparent, consensus-driven process involving member governments and expert committees. The Codex Secretariat provides administrative and coordination support but is not authorized to perform independent, unilateral revisions of draft standards. All modifications must go through formal committee reviews and official commenting steps to ensure global consensus and scientific validity.

40. (A) Step 4 - Consideration of comments by the relevant Codex Committee
At Step Four of the standard-setting procedure, the relevant Codex committee reviews and considers the technical comments submitted by member countries and international observer organizations during Step Three. The committee then modifies the draft text as needed before forwarding it to the Commission for consideration and potential adoption as a draft standard at Step Five.

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41. (A) 3, 2, 5, 1, 4
The development of a Codex standard begins with approving new work based on a project document. A proposed draft text is then prepared, which is circulated to member governments for comments. The relevant committee next reviews these comments, and finally, the Commission adopts the proposed draft text as a draft standard at Step Five.

42. (B) Step 5 Draft Standard Adoption - Subsidiary Committee
Draft standards at Step Five are officially adopted by the Codex Alimentarius Commission or its Executive Committee, not by individual subsidiary committees. While subsidiary committees draft the technical texts and review comments during Steps Two, Three, and Four, only the central Commission has the authority to approve these texts as official draft standards.

43. (A) To address urgent global food safety risks or when consensus is already robust.
The accelerated standard-setting procedure is invoked to address urgent global food safety risks or when there is already robust international consensus on a topic. This mechanism allows the commission to bypass commenting Steps Six and Seven, accelerating the final adoption of critical safety parameters without compromising scientific risk assessments or basic procedural transparency.

44. (C) The text is sent to the Commission for adoption as a draft standard at Step 5.
Once a subsidiary committee reviews the initial round of comments at Step Four and amends the proposed draft text, the document is forwarded to the Commission. The immediate next step in the standard-setting procedure is for the Commission to formally adopt the text as a draft standard at Step Five of the process.

45. (D) To ensure transparency, inclusiveness, and consensus among all member nations.
The two-round commenting system, occurring at Steps Three and Six, is designed to ensure maximum transparency, inclusiveness, and international consensus. This iterative feedback process allows member governments and observer organizations to thoroughly review technical

27. (A) Advisory Text - Legally enforceable international treaty
An advisory text published by Codex is designed to provide guidance and is not a legally enforceable international treaty. While horizontal standards apply across multiple food groups and vertical standards focus on specific commodities, all Codex texts remain voluntary. They only gain legal enforceability when national governments choose to incorporate them into their own domestic legislation.

28. (C) To reduce foodborne illness risks through a framework of Good Hygiene Practices.
Implementing the Codex Recommended International Code of Practice aims to reduce foodborne illness risks. It establishes a preventive framework of Good Hygiene Practices and Hazard Analysis and Critical Control Point systems. These measures ensure food safety from primary production to consumption, facilitating international trade without attempting to standardize cultural food properties or establish trade tariffs.

29. (D) General Standard for Contaminants and Toxins in Food and Feed (CXS 193-1995)
To establish maximum limits for environmental contaminants such as lead in food products, regulators should consult the General Standard for Contaminants and Toxins in Food and Feed. This specific standard lists maximum permitted levels for heavy metals, mycotoxins, and radionuclides, providing a harmonized, science-based reference that helps countries manage chemical safety risks effectively.

30. (C) To define the quality, composition, and safety factors required to trade a specific product.
A Codex Commodity Standard is designed to define the specific quality, compositional parameters, and essential safety factors required for trading a particular food product. These standards help prevent fraudulent commercial practices, ensure consumer expectations are met, and facilitate international agricultural trade by establishing clear, harmonized product identity criteria across different importing and exporting markets.

31. (B) The Codex Commission or its Executive Committee
In the standard eight-step Codex procedure, the decision to approve a proposal for new standard-setting work rests with the Codex Alimentarius Commission or its Executive Committee. This approval process involves reviewing a formal project document to confirm that the proposed work aligns with strategic priorities and meets critical consumer protection and fair trade criteria.

32. (D) P-II, Q-III, R-IV, S-I
In the Codex standard-setting process, Step Three involves circulating the proposed draft text to member countries for initial comments. At Step Five, the Commission reviews and adopts the draft standard. Step Six requires circulating the text for a second round of comments, and Step Eight represents the final formal adoption of the standard by the Commission.

33. (A) The accelerated procedure omits Steps 6 and 7, moving directly from Step 5 to Step 8.
The accelerated Codex procedure is designed to expedite standard-setting by omitting Steps Six and Seven, allowing the Commission to adopt a draft standard directly at Step Eight after Step Five. This fast-track mechanism is typically used for non-controversial updates or urgent safety issues, while still requiring rigorous scientific risk assessments in the earlier drafting stages.

34. (C) A formal proposal submitted to justify the need for new standard work.
Within the Codex standard-setting framework, a project document is a formal proposal submitted by a member nation or committee to justify the need for establishing a new standard. This document outlines the scope of the proposed work, its relevance to global trade, potential impact on consumer health, and overall alignment with strategic priorities.

35. (A) Both A and R are true and R is the correct explanation of A.
Step Five serves as a critical juncture in the standard-setting process, where the Commission reviews and formally adopts the proposed draft text as a draft standard. This step ensures that the development of the standard is progressing appropriately, meets technical requirements, and remains fully aligned with the strategic plans of the Joint Food Standards Programme.

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18. (C) They provide hygienic and processing best practices to ensure food safety.
Codex codes of practice provide systematic guidance on hygienic design, processing controls, and operational best practices across various food chains. These documents help manufacturers and regulators implement effective preventive controls, such as good hygiene practices. By following these operational benchmarks, producers can minimize physical, chemical, and biological contamination risks during food production.

19. (A) A substance used during processing that may leave residues but has no ongoing function in the final food.
A processing aid is a substance intentionally used during food manufacturing or processing to fulfill a technical purpose. Unlike food additives, processing aids do not perform any ongoing technological function in the final food product. While unavoidable and harmless residues may remain in the finished food, they are not consumed as food ingredients themselves.

20. (A) Both A and R are true and R is the correct explanation of A.
National governments frequently align their domestic food safety regulations with Codex standards to ensure international compatibility. Under the World Trade Organization Sanitary and Phytosanitary Agreement, national measures based directly on Codex standards are automatically presumed to be scientifically justified. This presumption protects countries from trade disputes while safeguarding consumer health through international consensus.

21. (B) They supersede horizontal regulations set by national authorities upon publication.
Codex general standards address cross-cutting issues, such as labeling, additives, and contaminants, that apply universally across food categories. However, because Codex texts are voluntary reference frameworks, these standards never automatically supersede or replace national regulations. Individual sovereign nations must independently choose to adopt and enforce these rules within their domestic legal systems.

22. (C) Statement I is correct and Statement II is incorrect.
Codex guidelines provide advisory frameworks for safety policies, such as general hygiene principles and risk assessment methodologies. On the other hand, commodity standards are not limited to raw agricultural items; they also cover processed products like milk, canned vegetables, and fish. These standards define the specific composition and quality parameters required for commercial trade.

23. (B) I, II, and IV
Codex codes of practice outline essential hygiene principles throughout the entire food chain, integrating hazard analysis and critical control point systems. These advisory documents are highly adaptable to various national food processing environments and facilities. They do not establish legally binding tariffs or trade penalties, which fall outside the safety-focused mandate of the commission.

24. (A) Mandatory Trade Tariffs
The Codex Alimentarius Commission publishes voluntary standards, guidelines, codes of practice, and maximum residue limits to harmonize food safety and quality rules. The commission has no authority to regulate, establish, or enforce mandatory trade tariffs, import taxes, or commercial customs duties, which are managed independently by sovereign governments and the World Trade Organization.

25. (B) General Principles of Food Hygiene (CXC 1-1969) - Code of Practice
The General Principles of Food Hygiene is formally categorized as a Codex Code of Practice, designated as CXC one-nineteen sixty-nine. This text outlines the foundational hygiene requirements necessary throughout the food chain. Other documents, such as import-export principles, are guidelines, while infant formula standards represent commodity standards rather than simple guidelines or practices.

26. (A) 3, 4, 2, 1
When evaluating proposals for new standard-setting work, the Executive Committee first prioritizes protecting consumer health, followed by protecting against fraudulent practices. The committee then assesses the volume of global production and consumption of the food commodity, and finally determines its overall amenability to standardization, ensuring resources are allocated to high-impact safety areas.

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drafts, raise safety or trade concerns, and collaboratively refine standard parameters before final adoption at Step Eight.

46. (C) China
The Government of China has officially hosted the Codex Committee on Food Additives since two thousand six. As the host country, China is responsible for organizing annual sessions, providing administrative facilities, and steering the technical work of the committee. This committee establishes maximum permitted use levels for additives to ensure global consumer safety.

47. (B) P-II, Q-IV, R-I, S-III
The Codex Committee on Food Additives and the Codex Committee on Pesticide Residues are both hosted by China. The Codex Committee on Contaminants in Foods is hosted by the Netherlands, while the Codex Committee on Food Hygiene is hosted by the United States, illustrating the shared global responsibility for managing these vital subject committees.

48. (D) It establishes Maximum Residue Limits (MRLs) for pesticide residues in specific foods.
The primary mandate of the Codex Committee on Pesticide Residues is to establish Maximum Residue Limits for agricultural pesticides in specific foods and animal feeds. The committee does not register chemical formulations or perform toxicological hazard assessments independently. Instead, it relies on scientific risk assessments conducted by the Joint FAO/WHO Meeting on Pesticide Residues.

49. (A) Any substance unintentionally present in food from production, processing, or environmental sources.
Under the CCCF framework, a contaminant is defined as any substance that is unintentionally present in food as a result of production, processing, packaging, transport, or environmental contamination. This definition excludes intentionally added technological substances like food additives and processing aids, focusing instead on managing risks associated with heavy metals, mycotoxins, and other unintended toxins.

50. (A) Both A and R are true and R is the correct explanation of A.
The Codex Committee on Contaminants in Foods relies heavily on the scientific advice provided by the Joint FAO/WHO Expert Committee on Food Additives when setting Maximum Levels. This is because the expert committee conducts independent toxicological risk assessments and dietary exposure evaluations, which are necessary to ensure that maximum limits are scientifically justified.

51. (A) CCFA assigns Acceptable Daily Intakes (ADIs) through its own internal toxicological committee.
The Codex Committee on Food Additives does not possess its own internal toxicological committee and cannot assign Acceptable Daily Intakes. Instead, toxicological evaluations and ADI assignments are performed independently by the Joint FAO/WHO Expert Committee on Food Additives. The committee uses these expert assessments to establish and endorse safe maximum permitted additive levels.

52. (A) Both Statement I and Statement II are correct.
The Codex Committee on Pesticide Residues drafts pesticide residue limits using safety evaluations from the Joint FAO/WHO Meeting on Pesticide Residues. Additionally, the committee is responsible for recommending standardized sampling and analytical methods, enabling regulatory authorities to accurately determine residue compliance in agricultural products and ensure consumer safety.

53. (B) I, III, and IV
The responsibilities of the Codex Committee on Food Additives include preparing priority lists of chemical substances for expert toxicological review, developing guidelines for safe additive use, and endorsing identity and purity specifications. Setting maximum levels for heavy metals and mycotoxins is the responsibility of the Codex Committee on Contaminants in Foods, not the CCFA.

54. (C) Residues of permitted veterinary antibiotics in poultry
The scope of the Codex Committee on Contaminants in Foods covers heavy metals, environmental toxins, mycotoxins, and radionuclides. Residues of permitted veterinary antibiotics in animal tissues are managed by the Codex Committee on Residues of Veterinary Drugs in Foods. This clear separation of mandates prevents overlapping work within the Codex subsidiary structure.

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exposure, while a marker residue is a specific compound monitored to reflect total residues. The target tissue is the specific animal organ or tissue selected for regulatory safety compliance monitoring.

93. (D) Veterinary drugs require animal pharmacokinetic studies to determine safety withdrawal periods.
Evaluating veterinary drug residues requires conducting detailed animal pharmacokinetic and depletion studies. These scientific trials determine how long a medicine remains in animal tissues, enabling JECFA to establish appropriate withdrawal periods. This step ensures that residues in milk, meat, or eggs fall below safe Maximum Residue Limits before agricultural products enter the consumer food supply.

94. (C) The highest concentration of drug residue legally permitted and recognized as safe in a food product.
JECFA defines the Maximum Residue Limit for veterinary drugs as the highest concentration of drug residue legally permitted or recognized as safe in a food product. This limit is based on the type and amount of residue considered safe for human consumption, ensuring that veterinary medicines used in livestock do not pose chronic health risks.

95. (A) Both A and R are true and R is the correct explanation of A.
JECFA establishes an Acute Reference Dose alongside the Acceptable Daily Intake for certain veterinary drugs. This is because some therapeutic substances, such as specific anthelmintics, can cause adverse physiological effects after a single exposure. Calculating the ARfD ensures that short-term consumption of high-residue animal products does not pose acute health risks to consumers.

96. (D) JECFA sets mandatory withdrawal periods that must be universally applied exactly as stated, superseding national regulations.
JECFA does not establish mandatory, universally applicable withdrawal periods that supersede national laws. Instead, JECFA recommends safe scientific limits like Maximum Residue Limits. It remains the responsibility of individual national regulatory authorities to calculate, implement, and enforce specific withdrawal times for veterinary medicines based on domestic agricultural practices and localized climate conditions.

97. (A) Both Statement I and Statement II are correct.
Muscle, liver, kidney, and fat are designated as target tissues to monitor veterinary drug residues in livestock. A marker residue is a selected parent drug or metabolite whose concentration has a known relationship to total residues in target tissues. Monitoring this marker allows regulatory laboratories to verify safety compliance in animal-derived foods efficiently.

98. (C) I, II, III, and IV
To recommend an MRL, JECFA evaluates the established ADI, reviews depletion studies to track residues in animal tissues, and ensures a validated analytical method exists for regulatory testing. The committee also conducts a dietary exposure assessment to verify that potential residue intake across different food products does not exceed the toxicological ADI.

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99. (A) Human intestinal microbiome disruption and promotion of antimicrobial resistance.
When evaluating antimicrobial veterinary drugs, JECFA must assess the potential for residues to disrupt the human intestinal microbiome and promote antimicrobial resistance. This specific microbiological hazard is not applicable to non-antimicrobial additives, requiring JECFA to determine microbiological safe levels in addition to conducting traditional chemical toxicological safety reviews.

100. (D) EDI - Estimated Daily Intake of residues by consumers
The acronym EDI stands for Estimated Daily Intake, which represents the calculated daily dietary exposure to drug residues based on MRLs and food consumption models. This estimate is compared directly against the ADI. Other concepts, like injection sites, require careful toxicological evaluation, while ARfD is used to assess acute rather than chronic exposure.

101. (B) JECFA will not recommend the proposed MRLs because the calculated EDI exceeds the safe ADI.
If the Estimated Daily Intake calculated from proposed residue limits exceeds the safe Acceptable Daily Intake, JECFA will not recommend those MRLs. The expert committee operates on strict

limits specify the highest concentration of a pesticide residue or veterinary drug permitted in agricultural products and animal tissues, providing internationally recognized, science-based safety benchmarks that facilitate global trade.

65. (A) Both A and R are true and R is the correct explanation of A.
Inclusion of a food additive in the General Standard for Food Additives requires a thorough safety evaluation and toxicological review by the Joint FAO/WHO Expert Committee on Food Additives. This scientific review establishes safe exposure levels, ensuring that the additive's use is technologically justified and poses no appreciable risk to consumer health.

66. (C) CCFH performs quantitative microbiological risk assessments internally without independent experts.
The Codex Committee on Food Hygiene does not perform quantitative microbiological risk assessments internally. Instead, it acts as a risk management body, relying on independent scientific risk assessments provided by the Joint FAO/WHO Expert Meetings on Microbiological Risk Assessment. This division ensures that risk management guidelines are based on unbiased scientific consensus.

67. (C) Statement I is correct and Statement II is incorrect.
The preamble of the General Standard for Food Additives states that additives should only be used when there is a technological need and their use does not mislead consumers. However, the standard does not ban food colors; it permits their safe, regulated use under specific maximum limits and defined technological conditions within the food category system.

68. (A) I, II, and III
For a food additive to be included in the GSFA, its use must serve a recognized technological function, benefit consumers, and present no health risks at proposed levels. There is no requirement for additives to be natural; synthetic compounds are permitted if they are evaluated as safe and technologically justified by expert panels.

69. (B) Macronutrient replacer
Recognized functional classes of food additives within the General Standard for Food Additives include flavor enhancers, bulking agents, and firming agents, which perform specific technological roles in food. Macronutrient replacer is not a recognized functional class under this framework, as ingredients that replace fats or carbohydrates are typically classified as food components rather than food additives.

70. (C) Table 1 - Lists additives with permitted food categories and maximum levels.
In the General Standard for Food Additives database, Table One lists individual additives alphabetically, detailing their permitted food categories and maximum levels. Table Two is organized by food category, listing all permitted additives for each category. Table Three lists additives with acceptable daily intakes of "not specified" that are permitted generally under good manufacturing practices.

71. (A) 3, 1, 2, 4
To verify additive permissions, an officer first identifies the additive's name or international number. Next, they determine the corresponding food category code in the database. The officer then searches for the additive's specific provision under that food category and finally verifies if the level in the product complies with the established maximum limit.

72. (A) Category 13.0 - Fresh meats, poultry, and game
In the Food Category System of the General Standard for Food Additives, Category Thirteen is dedicated to food products intended for special dietary uses, including infant formulas and medical foods. Fresh meats, poultry, and game fall under Category Eight, highlighting the importance of using the correct codes when looking up permitted additive provisions.

73. (B) The additive must be used at the minimum level necessary to achieve its technological effect.
When an additive is listed in the GSFA with a maximum level of Good Manufacturing Practice, it indicates that the substance has very low toxicity. Manufacturers are not permitted to use unrestricted quantities; instead, they must limit usage to the minimum amount necessary to achieve the desired technological effect in the food product.

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55. (D) CCPR - Extraneous Maximum Residue Limits (EMRLs)
The Codex Committee on Pesticide Residues is responsible for establishing Extraneous Maximum Residue Limits for legacy pesticides that persist in the environment. In contrast, the Codex Committee on Food Additives handles intentional food additives rather than environmental contaminants, which are managed by the Codex Committee on Contaminants in Foods, ensuring distinct areas of scientific focus.

56. (A) 1, 2, 4, 3
The integration of an additive into the General Standard for Food Additives begins when the committee proposes the substance for evaluation. The Joint FAO/WHO Expert Committee on Food Additives then conducts a safety assessment to establish an Acceptable Daily Intake. Next, the committee drafts use provisions, which are finally adopted by the Commission.

57. (B) CCFL - Codex Committee on Food Legislation
The acronym CCFL stands for the Codex Committee on Food Labelling, which is hosted by Canada and designs international labeling guidelines. There is no Codex committee named the Codex Committee on Food Legislation. Understanding these acronyms helps regulatory officers identify the correct committee responsible for developing specific horizontal food safety and labeling requirements.

58. (B) To regulate legacy pesticide residues that persist in the environment despite no longer being authorized.
Extraneous Maximum Residue Limits are established by the Codex Committee on Pesticide Residues to regulate residues of legacy pesticides. These persistent organic pollutants, such as DDT, remain in agricultural soils and environments even though they are no longer authorized for active agricultural use, ensuring food safety against historical environmental contaminants.

59. (A) Codex Maximum Residue Limits (CXLs) for Pesticides database
To verify compliance regarding fungicide residues on imported apples, food safety officers should consult the official Codex Maximum Residue Limits database. This resource provides established limits for pesticide residues across specific food commodities. These reference limits are based on Good Agricultural Practice trials and scientific evaluations, ensuring safe consumer dietary exposure levels globally.

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60. (C) CCFA manages intentionally added technological substances, whereas CCCF manages unintended environmental or processing toxins.
The critical distinction between the committees lies in intent. The Codex Committee on Food Additives manages intentionally added substances that perform specific technological functions in food. Conversely, the Codex Committee on Contaminants in Foods regulates unintended chemical substances, such as heavy metals or environmental pollutants, that enter the food supply during production or processing.

61. (D) United States of America
The United States of America serves as the official host country for the Codex Committee on Food Hygiene. In this role, the United States is responsible for coordinating committee sessions, preparing documentation, and guiding the development of critical hygiene texts, including the General Principles of Food Hygiene and its integrated HACCP guidelines.

62. (C) P-IV, Q-III, R-I, S-II
Within the GSFA framework, emulsifiers maintain a uniform mixture of immiscible phases, while preservatives protect food against microbial deterioration. Antioxidants prolong shelf life by preventing degradation caused by oxidation, and sequestrants control the chemical environment by binding free metal ions, ensuring physical and chemical stability in processed food formulations.

63. (B) It defines use conditions for permitted additives across foods using a hierarchical Food Category System.
The General Standard for Food Additives utilizes a structured, hierarchical Food Category System to define the specific conditions under which permitted additives may be used. This organizational design allows users to easily determine maximum permitted levels and technological functions for additives across various food types, ensuring clear, comprehensive, and standardized global safety conditions.

64. (D) Codex Maximum Residue Limit for agricultural pesticides or veterinary drugs
The acronym CXL stands for a Codex Maximum Residue Limit that has been officially adopted by the Codex Alimentarius Commission. These

and chronic oral toxicity studies, and potential reproductive or developmental impacts of food additives. The committee operates strictly on scientific principles, meaning that commercial factors, market demand, and the economic viability of manufacturing the chemical substance are completely excluded from safety evaluations.

84. (D) The geographical location of the producer plant
When establishing an Acceptable Daily Intake, JECFA reviews genotoxicity, carcinogenicity, pharmacokinetic profiles, and dietary exposure models. The physical, political, or geographical location of the manufacturing plant is completely irrelevant to scientific safety evaluations. This exclusion ensures that JECFA risk assessments are objective, science-based, and free from regional or commercial bias.

85. (B) Pharmacokinetics - Study of substance absorption, distribution, metabolism, and excretion
Pharmacokinetics is the scientific study of how a chemical substance is absorbed, distributed, metabolized, and excreted by the body. Teratogenicity studies the capacity to induce physical defects during fetal development, while genotoxicity evaluates DNA mutations. Carcinogenicity assesses tumor-inducing potential, making pharmacokinetic data essential for understanding the biological fate of ingested food chemical additives.

86. (A) 5 mg/kg bw/day
To calculate the Acceptable Daily Intake, the No Observed Adverse Effect Level derived from animal studies is divided by an uncertainty factor, typically one hundred. Applying this formula to a limit of five hundred milligrams per kilogram body weight per day results in a human safety threshold of five milligrams per kilogram body weight per day.

87. (D) PTWI - Provisional Temporary Working Index used for evaluating toxic metals
The acronym PTWI stands for Provisional Tolerable Weekly Intake, which is a safety reference value used by JECFA to evaluate heavy metals and other contaminants that accumulate in human tissues. It does not mean Provisional Temporary Working Index. Understanding these safety metrics is critical for setting appropriate maximum limits for environmental food contaminants.

88. (A) The BMD approach models the entire dose-response curve rather than relying on a single experimental dose.
JECFA utilizes the Benchmark Dose approach in modern risk assessments because it models the entire dose-response curve from toxicological studies. Unlike the legacy NOAEL method, which relies on a single experimental dose, the BMD approach provides a more mathematically robust estimate of safe exposure limits, particularly for contaminants lacking a clear toxicological threshold.

89. (B) The additive is safe under GMP because of very low toxicity and safe exposure levels.
An ADI “not specified” indicates that a food additive has extremely low toxicity based on JECFA safety reviews. Therefore, the substance does not pose a health risk under standard dietary exposure levels. Regulators should conclude that the additive is safe to use under good manufacturing practices, where usage is restricted to the minimum technological level.

90. (B) To ensure commercial additives match the identity and purity of the toxicologically tested substance.
The primary purpose of JECFA food additive specifications is to ensure that commercial additives match the chemical identity and purity of the substances that underwent toxicological safety testing. These specifications establish clear criteria for composition, purity, and active ingredients, preventing manufacturers from using substandard or contaminated chemicals in commercial food products.

91. (A) Acute Reference Dose
The acronym ARfD stands for Acute Reference Dose, which represents an estimate of the amount of a substance in food that can be safely ingested within a twenty-four-hour period or less without appreciable health risk to the consumer. This threshold protects against acute toxicity resulting from short-term exposure to agricultural residues.

92. (C) P-IV, Q-II, R-III, S-I
In veterinary drug regulation, the Maximum Residue Limit is the legally permitted concentration of residue in food. The Acute Reference Dose protects against short-term

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74. (B) Verify INS 211 in the GSFA database for permission and maximum limits in that category.
When evaluating a food label declaring a preservative, food safety officers must verify the International Numbering System code in the General Standard for Food Additives. This search confirms whether the chemical, sodium benzoate, is permitted within that specific food category and ensures its concentration complies with the established maximum limits for safe consumer intake.

75. (A) It provides a food hygiene foundation from primary production to consumption, integrating HACCP principles.
The Codex General Principles of Food Hygiene provides a fundamental safety framework applicable from primary agricultural production through to final consumption. This document integrates the hazard analysis and critical control point system and good hygiene practices, offering a flexible and comprehensive guide that helps both businesses and regulators prevent biological contamination risks across food chains.

76. (B) 1956
The Joint FAO/WHO Expert Committee on Food Additives was established in nineteen fifty-six to provide independent scientific advice on food safety. This expert committee predates the Codex Alimentarius Commission and serves as the primary scientific body performing toxicological risk assessments, chemical exposure evaluations, and purity specifications for food additives, contaminants, and veterinary drug residues.

77. (D) P-II, Q-I, R-IV, S-III
In toxicological evaluations, the No Observed Adverse Effect Level is the highest dose with no observed adverse effects, while the Acceptable Daily Intake is the safe lifetime ingestion estimate. The Benchmark Dose Lower Confidence Limit serves as a risk point of departure, and the uncertainty factor extrapolates animal data to protect diverse human populations.

78. (C) JECFA members are independent experts serving in their personal capacities, not representing governments.
JECFA operates as an independent scientific advisory body whose members are appointed based on their technical expertise. Experts serve entirely in their personal capacities rather than representing their national governments or commercial organizations. This independence ensures that safety risk assessments for food additives, contaminants, and veterinary drug residues are objective, unbiased, and scientifically sound.

79. (B) An estimate of daily dietary intake over a lifetime without appreciable health risk to the consumer.
The Acceptable Daily Intake is defined as an estimate of the amount of a chemical substance in food that can be ingested daily over a lifetime without appreciable health risk to the consumer. It is calculated based on toxicological data and expressed in milligrams of the substance per kilogram of body weight per day.

80. (A) Both A and R are true and R is the correct explanation of A.
JECFA applies a standard safety factor of one hundred to the No Observed Adverse Effect Level to calculate the Acceptable Daily Intake for humans. This default factor of one hundred accounts for inter-species differences when extrapolating from animal studies, as well as intra-species differences to protect sensitive subgroups within the human population.

81. (A) JECFA drafts legally binding international food standards that bypass the Codex process.
JECFA is a scientific advisory panel rather than a regulatory or legislative body. It cannot draft legally binding international food standards or bypass the Codex process. Instead, JECFA provides essential risk assessments, purity specifications, and toxicological safety evaluations that the Codex Alimentarius Commission uses to develop and adopt harmonized global food safety regulations.

82. (C) Statement I is correct and Statement II is incorrect.
JECFA allocates a temporary ADI when existing data suggest short-term safety but further research is required to resolve specific scientific uncertainties. However, an ADI "not specified" indicates that a substance has very low toxicity and is safe under good manufacturing practice, rather than representing an extreme chemical hazard or ban.

83. (C) I, II, and III
JECFA safety assessments evaluate animal biochemical and metabolic pathways, short-term

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safety principles, meaning that proposed residue limits must be adjusted downward until human dietary exposure falls safely within the established lifetime toxicological threshold.

102. (C) Marker residue - The visual bruising left on animal tissue post-injection
A marker residue is a specific parent drug, metabolite, or chemical compound monitored to reflect total residues of toxicological concern in target tissues. It is not visual bruising left on animal tissue. Understanding this chemical definition is critical for regulatory laboratories using validated analytical methods to test animal products for veterinary drug compliance.

103. (D) ADI protects against long-term chronic exposure, while ARfD protects against single-event acute toxicity.
Calculating both toxicological limits is necessary because they protect against different exposure pathways. The Acceptable Daily Intake protects consumers from long-term, chronic exposure over a lifetime. Conversely, the Acute Reference Dose safeguards against potential single-event, short-term toxic reactions that could occur after consuming a food product containing high residue levels.

104. (A) The milk is safe because life-long exposure at the MRL will not exceed the toxicological ADI.
A laboratory report indicating drug residues exactly at the Codex MRL demonstrates that the food product is safe for consumption. Because MRLs are established based on toxicological safety limits, life-long dietary exposure to residues at or below these limits will not exceed the Acceptable Daily Intake, ensuring adequate public health protection.

105. (B) Measuring total residues is highly complex, expensive, and impractical for routine screening.
Monitoring a single designated marker residue is preferred because measuring total veterinary drug residues is highly complex, expensive, and impractical for routine laboratory testing. By focusing on a specific, representative compound with a known concentration ratio, regulatory laboratories can perform cost-effective and efficient compliance screenings of imported animal-derived foods.

106. (B) Codex Committee on Food Hygiene (CCFH)
The Joint FAO/WHO Expert Meetings on Microbiological Risk Assessment was established to provide scientific advice and support to the Codex Committee on Food Hygiene. JEMRA conducts independent assessments of biological hazards in foods, enabling the hygiene committee to draft evidence-based codes of practice, microbiological criteria, and global food hygiene guidelines.

107. (A) P-II, Q-IV, R-I, S-III
In Quantitative Microbiological Risk Assessment, hazard identification lists biological pathogens, while hazard characterization evaluates the severity of health effects using dose-response models. Exposure assessment estimates pathogen ingestion levels, and risk characterization integrates this data to estimate the overall probability and severity of adverse health effects within a target population.

108. (C) JEMRA conducts scientific risk assessments on pathogen-commodity pairings to support CCFH guidelines.
JEMRA is mandated to conduct independent scientific risk assessments on specific pathogen-commodity combinations, such as Salmonella in poultry. These assessments provide the scientific foundation that the Codex Committee on Food Hygiene requires to draft global codes of hygienic practice, ensuring that international risk management standards are based on robust microbiological evidence.

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109. (D) It evaluates the nature of adverse health effects of biological agents, heavily using dose-response models.
Hazard characterization in microbiological risk assessment is defined as the qualitative or quantitative evaluation of the nature of adverse health effects associated with biological food hazards. This phase frequently utilizes mathematical dose-response models to describe the relationship between the level of pathogen exposure and the probability of infection or illness.

110. (A) Both A and R are true and R is the correct explanation of A.
Establishing dose-response relationships for microbial hazards is highly complex compared to chemical substances. This is because pathogens can multiply or die off in food matrices depending on environmental conditions like temperature and

pH. Additionally, infection outcomes are heavily influenced by the host immune status and the specific virulence of the bacterial strain.

111. (B) JEMRA determines the Acceptable Level of Protection (ALOP) for member countries.
JEMRA does not possess the authority to determine the Acceptable Level of Protection for member nations. Establishing an ALOP is a policy-based risk management decision that must be made independently by individual national governments. JEMRA operates strictly as a scientific body, providing unbiased microbiological risk assessments that support international standard development.

112. (C) Statement I is correct and Statement II is incorrect.
Exposure assessments for microbiological hazards must model pathogen dynamics, including growth, survival, or decline during processing, storage, distribution, and preparation. Unlike chemical hazards, which remain relatively static in concentration, microbial populations fluctuate dynamically based on environmental conditions and food handling practices, adding complexity to exposure modeling efforts.

113. (C) I, II, and IV
JEMRA evaluates biological hazards such as Salmonella in eggs and poultry, and Listeria monocytogenes in ready-to-eat foods. For chemical contaminants like lead and cadmium, JECFA is the responsible expert committee, illustrating how different scientific groups provide specialized safety advice depending on the nature of the hazard.

114. (C) Outbreak Litigation
The four official steps of a Codex Microbiological Risk Assessment are hazard identification, hazard characterization, exposure assessment, and risk characterization. Outbreak litigation is a post-event legal process handled by domestic courts and is not part of the scientific framework used to evaluate microbiological food safety hazards.

115. (A) Enterobacter sakazakii (Cronobacter) - Powdered infant formula
Cronobacter sakazakii is highly associated with powdered infant formula and has been extensively evaluated by JEMRA. This bacterium can survive in dry environments and poses severe health risks, such as meningitis, to vulnerable infants. Understanding this pairing helped the hygiene committee establish specific microbiological criteria for infant formula manufacturing.

116. (D) The product supports growth, requiring a strict exposure assessment and risk management strategy.
When a food product's physical parameters, such as a pH of 4.8 and water activity of 0.95, exceed growth limits, the matrix will support pathogen multiplication. Food safety officers must conclude that the product requires a rigorous exposure assessment and targeted risk management strategies to prevent Listeria contamination.

117. (B) Cronobacter spp. - High thermal resistance surviving commercial canning
Cronobacter species do not possess high thermal resistance and are easily destroyed by pasteurization and commercial canning processes. Instead, contamination typically occurs post-processing during packaging or preparation. Recognizing this exposure pathway led JEMRA to emphasize strict sanitation and dry-cleaning controls in powdered infant formula manufacturing facilities.

118. (C) The difficulty in predicting varied consumer cooking and handling habits that alter microbial counts.
The high level of scientific uncertainty in exposure assessments is primarily caused by the difficulty in predicting diverse consumer cooking, storage, and handling habits. Variations in home refrigeration temperatures and cooking times directly alter microbial survival and growth, making it challenging for risk assessors to model exact pathogen consumption levels.

119. (D) JEMRA risk assessments and the CCFH Code of Hygienic Practice for Fresh Fruits
When investigating outbreaks linked to leafy greens, food safety officers should consult JEMRA risk assessments and the Code of Hygienic Practice for Fresh Fruits and Vegetables. These resources provide scientific data on contamination pathways and recommend agricultural and processing hygiene controls to prevent microbial pathogens from entering fresh produce chains.

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120. (A) Microbes can multiply, cause infection from a single cell, and undergo secondary human transmission.
Microbial risk characterization presents unique challenges because biological pathogens can multiply dynamically within food matrices. Furthermore, certain virulent pathogens can cause infection from a single cell. Unlike chemical toxins, microbial infections can also spread through secondary person-to-person transmission, significantly increasing the potential public health impact of a contamination event.

121. (B) 1963
The Joint FAO/WHO Meeting on Pesticide Residues was first established in nineteen sixty-three to provide independent scientific advice on pesticide safety. JMPR conducts toxicological evaluations of agricultural chemicals, determines safe intake levels, and estimates maximum residue levels, supporting the Codex Committee on Pesticide Residues in establishing harmonized global trade limits.

122. (B) P-IV, Q-III, R-I, S-II
JMPR serves as the independent scientific group conducting risk assessments, while CCPR is the committee recommending MRLs to the Commission. Good Agricultural Practice represents the authorized, safe application of pesticides, and CXL defines the official adopted Codex Maximum Residue Limit, ensuring a science-based framework for pesticide safety in food trade.

123. (A) It comprises a WHO toxicology group and an FAO panel on residue chemistry and analytical methods.
The annual meetings of the Joint FAO/WHO Meeting on Pesticide Residues are structured into two distinct expert groups. The WHO toxicology group evaluates the chemical hazard and establishes safe intake levels. The FAO panel reviews residue chemistry and supervised field trials, ensuring that recommended residue limits are both safe and agriculturally realistic.

124. (C) The nationally authorized safe pesticide applications under actual conditions for effective pest control.
Good Agricultural Practice in the use of pesticides is defined as the nationally authorized, safe application of chemical sprays under actual conditions to achieve effective pest control. This practice specifies the minimum effective chemical concentration and the required pre-harvest interval, ensuring that subsequent residues in food products remain as low as possible.

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125. (A) Both A and R are true and R is the correct explanation of A.
JMPR conducts dietary risk assessments to ensure that proposed Maximum Residue Limits do not lead to chemical intakes exceeding safe toxicological thresholds. Although an MRL reflects the maximum residue expected under Good Agricultural Practice, JMPR will not recommend the limit if theoretical food consumption models indicate a risk of exceeding safe intakes.

126. (C) MRLs are based on toxicological limits rather than agricultural practice, making them direct safety limits.
Codex Maximum Residue Limits are not direct toxicological safety limits. Instead, they are trading limits based on residue levels found during supervised field trials conducted under Good Agricultural Practice. JMPR verifies that these agricultural residue levels are toxicologically safe, but the numerical limit itself reflects proper chemical application rather than a toxicity threshold.

127. (A) Both Statement I and Statement II are correct.
Supervised field trials must reflect the maximum application rate and minimum pre-harvest interval authorized under national Good Agricultural Practices. The chemical residue data collected from these standardized agricultural trials are used to estimate the maximum potential residue levels that might occur when treated food commodities enter international trade.

128. (B) I, II, and III
JMPR dietary exposure assessments evaluate established toxicological reference values, food consumption data from regional databases, and median residue levels found during field trials. The commercial sales figures of chemical manufacturing companies are completely excluded, ensuring that safety evaluations are based entirely on toxicological data and consumer exposure patterns.

(D) It maintains transparency regarding the global animal disease situation.

22. A country implements a ban on importing poultry products to prevent the introduction of Avian Influenza. The domestic poultry industry immediately benefits from increased prices. What is the cause-effect relationship under the SPS Agreement?
(A) The measure is valid only if the primary purpose is the economic protection of the domestic poultry industry.
(B) The measure is invalid because any economic benefit to domestic farmers violates the National Treatment principle.
(C) The measure is invalid because Avian Influenza regulations are governed by the TBT Agreement rather than the SPS.
(D) The measure is valid if scientifically justified to protect animal health, regardless of domestic economic benefits.

23. Match the WTO concepts (List I) with their descriptions (List II).
List I: WTO Concepts
P. Harmonization
Q. Equivalence
R. Transparency
S. Risk Assessment
List II: Descriptions
I. Establishing enquiry points and notifying trade partners
II. Basing national measures on international standards
III. Evaluating likelihood of entry, establishment, or spread of a pest
IV. Accepting alternative measures that yield the same level of protection
(A) P-II, Q-IV, R-I, S-III
(B) P-IV, Q-II, R-III, S-I
(C) P-II, Q-I, R-IV, S-III
(D) P-III, Q-IV, R-I, S-II

24. What is the best description of a "Technical Regulation" under the TBT Agreement?
(A) A document approved by a recognized body that provides rules or guidelines for common use, with which compliance is voluntary.
(B) A scientific evaluation of the potential adverse health effects of a chemical additive.
(C) A document which lays down product characteristics or their related processes and production methods, with which compliance is mandatory.
(D) A quantitative limit on the volume of a specific product that can be imported.

25. All of the following fall under the scope of the Agreement on Technical Barriers to Trade (TBT) EXCEPT:
(A) Nutritional labelling requirements
(B) Quality requirements for fresh vegetables
(C) Packaging regulations for environmental protection
(D) Quarantine regulations for imported livestock

26. A government introduces a new mandatory certification process for organic food claims to prevent consumer deception. Under which WTO framework would this measure primarily be evaluated?
(A) The TBT Agreement
(B) The SPS Agreement
(C) The TRIPS Agreement
(D) The Agreement on Agriculture

27. Which of the following is a correct pair indicating the measure and its corresponding WTO agreement?
(A) Setting maximum limits for aflatoxin in peanuts - TBT Agreement
(B) Mandating font sizes for allergen warnings on labels - TBT Agreement
(C) Banning imports of apples to prevent fire blight - TBT Agreement
(D) Defining standard liquid volumes in bottled beverages - SPS Agreement

28. Country X exports cheese to Country Y. Country Y rejects the shipment, citing that the cheese does not meet its mandatory minimum fat percentage standard required for a product to be sold as "cheese". Is this an SPS or TBT issue, and why?
(A) It is an SPS issue because it involves agricultural food products meant for human consumption.
(B) It is a TBT issue because it concerns composition and quality, not risks from pests or toxins.
(C) It is an SPS issue because dietary fat levels directly trigger severe chronic diseases.
(D) It is a TBT issue because cheese represents a manufactured dairy product with quality standards.

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considers local dietary patterns and scientific justifications. While FSSAI is not mandated to adopt every international standard verbatim, alignment is pursued to protect public health and facilitate international trade compliance.

139. (A) The alignment of national technical regulations and standards with relevant international standards.
Harmonization is defined as the alignment of national technical regulations and food safety standards with relevant international standards, particularly the Codex Alimentarius. This process aims to protect consumer health while reducing technical barriers to trade, ensuring that food products can move across international borders without facing conflicting national safety requirements.

140. (A) Both A and R are true and R is the correct explanation of A.
FSSAI constitutes specialized Shadow Committees that correspond to individual Codex committees. These bodies are tasked with analyzing technical working documents, consulting national stakeholders, and drafting India's official positions. This preparation ensures that India's interests and scientific data are effectively represented and communicated during international Codex standard-setting sessions.

141. (D) A country is forbidden from having a standard stricter than Codex under any circumstance.
Under the WTO Sanitary and Phytosanitary Agreement, sovereign nations are not forbidden from implementing food safety standards that are stricter than Codex. However, if a country chooses to enforce more stringent limits, it must provide scientific justification based on a rigorous risk assessment to prove the measure is not an arbitrary trade barrier.

142. (A) Both Statement I and Statement II are correct.
Sovereign nations can establish food safety measures that provide a higher level of protection than Codex standards if they provide scientific justification. Furthermore, if a country aligns its national regulations completely with Codex, those measures are automatically presumed to be consistent with the provisions of the WTO SPS Agreement, simplifying trade compliance.

143. (A) I, II, and IV
The primary functions of India's National Codex Contact Point include receiving official Codex documents, distributing these materials to national stakeholders and government departments, and coordinating participation in international meetings. Levying custom duties on imported food items is a financial customs responsibility that falls completely outside the mandate of the NCCP.

144. (D) Promoting monopolies for multinational food corporations in developing countries.
Harmonization aims to protect consumer health based on global scientific consensus and facilitate fair agricultural trade by removing non-tariff barriers. Promoting commercial monopolies for multinational food corporations is not an objective of the commission. The focus remains on establishing a safe, transparent, and competitive trading environment that benefits both consumers and producers.

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145. (A) FSSAI - Hosts the National Codex Contact Point (NCCP)
The Food Safety and Standards Authority of India officially hosts the National Codex Contact Point. This structural placement ensures that India's domestic standard-setting activities are closely integrated with international Codex frameworks, allowing FSSAI to effectively coordinate national positions and harmonize food safety standards with global recommendations.

146. (C) Adopt the standard if the GSFA has a provision fitting the local dietary context after JECFA evaluation.
When drafting a national standard for a new food additive, the most appropriate approach is to adopt the standard if the GSFA has a corresponding provision. This decision should consider whether the provision fits the local dietary context and has undergone independent scientific safety and exposure evaluation by JECFA, ensuring safety without duplicating toxicological research.

147. (A) WTO SPS - Sets the quantitative MRLs for heavy metals in food
The World Trade Organization Sanitary and Phytosanitary Agreement does not set quantitative safety limits or MRLs for contaminants. Instead, the agreement establishes the legal trade rules governing food safety measures and formally recognizes Codex standards as the scientific

129. (A) Deliberately withholding scientific uncertainties from the public to prevent panic.
Risk communication requires the transparent, interactive exchange of information and opinions among all stakeholders, including consumers and risk managers. Deliberately withholding scientific uncertainties or risk assessment findings from the public is not an authorized practice. Open communication builds trust and ensures that stakeholders are fully informed about the scientific basis of food safety decisions.

130. (C) Risk Communication - The interactive exchange of scientific risk data among stakeholders
Risk communication is defined as the interactive exchange of safety data, opinions, and scientific findings among risk assessors, risk managers, and other interested stakeholders. In contrast, risk assessment is the scientific evaluation of hazards, and risk management involves selecting and implementing policy options to control risks, maintaining a clear separation of roles.

131. (A) 0.05 mg/person/day
To estimate the daily dietary intake of a pesticide residue, the median residue level found in supervised trials is multiplied by the average daily consumption of that food item. Multiplying a residue level of zero point five milligrams per kilogram by a consumption level of zero point one kilograms yields zero point zero five milligrams per person per day.

132. (D) GEMS/Food - Global Database of Pesticide Manufacturing Plants
The acronym GEMS/Food stands for the Global Environment Monitoring System Food Contamination Monitoring and Assessment Programme, which is a database containing international food consumption patterns. It is not a database of pesticide manufacturing plants. Understanding this system is essential for JMPR to model regional dietary exposure to chemical contaminants.

133. (B) It builds trust and transparency, allowing managers to address concerns of all stakeholders.
Effective risk communication builds public trust and transparency, enabling risk managers to address concerns raised by consumers, industry, and trade partners. This interactive exchange ensures that the scientific rationale behind standards is understood, facilitating smoother national adoption and reducing international trade conflicts regarding food safety and agricultural regulations.

134. (C) Explain the MRL is based on GAP data; exceeding it shows misuse but is not a direct health hazard.
Regulators should explain that pesticide MRLs are trading limits based on Good Agricultural Practice trials rather than direct human toxicity thresholds. Exceeding an MRL indicates that the pesticide was misused during farming, but does not automatically mean the food is toxic, helping to educate stakeholders while maintaining strict safety compliance.

135. (D) Communication must be interactive, starting early to ensure transparency and scientific integrity.
A core guiding principle is that risk communication must be interactive and start early in the risk analysis process. This early engagement ensures transparency and scientific integrity, allowing stakeholders to raise concerns and understand risk management decisions before standards are finalized, rather than relying on one-way announcements after policies are implemented.

136. (A) Food Safety and Standards Authority of India (FSSAI)
The Food Safety and Standards Authority of India acts as the National Codex Contact Point for India. Housed within FSSAI, the NCCP coordinates all Codex activities, distributes documentation to stakeholders, coordinates national responses, and represents India at international sessions, ensuring that domestic standard-setting aligns with international food safety benchmarks.

137. (B) P-II, Q-III, R-I, S-IV
The NCCP of India acts as the nodal contact agency, while the National Codex Committee advises on policy matters. Shadow committees coordinate the national response to specific Codex committees, and FSSAI hosts the contact point, ensuring that Indian food safety standards are effectively aligned with international recommendations and agricultural trade policies.

138. (B) India harmonizes national standards with Codex where feasible and scientifically justified locally.
India harmonizes its national standards under the Food Safety and Standards Regulations with Codex standards whenever feasible. This process

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CHAPTER 30

WTO Agreements: SPS, TBT and International Accreditation

1. When was the World Trade Organization (WTO) officially established, succeeding the General Agreement on Tariffs and Trade (GATT)?
(A) 1 January 1994
(B) 1 January 1995
(C) 1 January 1996
(D) 1 January 1997

2. Consider the following statements regarding the WTO Agreement on Sanitary and Phytosanitary Measures (SPS):
1. It applies to all measures that protect human, animal, or plant life from risks arising from pests or diseases.
2. It allows member countries to set their own standards higher than international standards if scientifically justified.
3. It regulates technical barriers such as packaging design and labelling requirements.
4. It encourages members to base their measures on international standards.

Which of the above statements is/are correct?
(A) 1, 2, and 3
(B) 1, 2, and 4
(C) 2, 3, and 4
(D) 1, 3, and 4

3. Which of the following is a correct statement regarding the core objective of the SPS Agreement in international food trade?
(A) To ensure health regulations do not create arbitrary trade barriers.
(B) To eliminate global tariffs and customs duties on all agricultural foods.
(C) To mandate uniform nutritional labelling rules for all WTO member states.
(D) To establish a single global currency for trading agricultural commodities.

4. Given below are two statements:
Statement I: The WTO does not develop international food safety standards itself but relies on recognized international standard-setting bodies.
Statement II: The Codex Alimentarius Commission is explicitly recognized by the WTO SPS Agreement as the relevant standard-setting body for food safety.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

5. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Under the SPS Agreement, countries can temporarily impose precautionary measures if scientific evidence is insufficient.
Reason (R): The SPS Agreement strictly prohibits any protective measures unless a full and final scientific risk assessment is completed.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

6. Which of the following statements regarding the scope of the SPS Agreement is incorrect?
(A) It covers measures protecting human health from food-borne diseases and toxins.
(B) It covers measures protecting plant life from the spread of destructive pests.
(C) It covers measures protecting animal health from foreign or exotic diseases.
(D) It covers measures specifying container dimensions and weights for fair trade.

7. A developing country adopts a stringent pesticide residue limit based on a recent local hazard

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outbreak, which restricts imports from a major trade partner. What is the most likely regulatory effect under WTO rules?
(A) The trade partner will automatically face sanctions from the World Bank.
(B) The developing country must provide a scientific risk assessment justifying the deviation from international standards.
(C) The WTO will immediately ban the developing country from exporting any agricultural goods.
(D) The international standard-setting body will revise its global standard to match the developing country's limit within 30 days.

8. Match the international organizations (List I) with their respective areas of standard-setting recognized by the SPS Agreement (List II).
List I: International Organizations
P. Codex Alimentarius Commission
Q. World Organisation for Animal Health (OIE)
R. International Plant Protection Convention (IPPC)
S. World Trade Organization (WTO)
List II: Areas of Standard-Setting
I. Plant health and phytosanitary measures
II. Food safety and human health
III. Animal health and zoonoses
IV. Trade dispute settlement
(A) P-II, Q-III, R-I, S-IV
(B) P-III, Q-II, R-I, S-IV
(C) P-II, Q-I, R-III, S-IV
(D) P-I, Q-III, R-II, S-IV

9. What is the most appropriate interpretation of the "Equivalence" principle under the SPS Agreement?
(A) All member countries must enforce identical inspection procedures for both domestic and imported food products.
(B) Developing nations must upgrade their regulatory laboratories to match the technical capacity of developed partners.
(C) Import tariffs applied to foreign agricultural goods must match the financial subsidies provided to domestic farmers.
(D) Importing countries must accept alternative measures if they achieve the importing country's level of protection.

10. All of the following are recognized standard-setting bodies under the SPS Agreement, EXCEPT:
(A) International Organization for Standardization (ISO)
(B) Codex Alimentarius Commission (CAC)
(C) International Plant Protection Convention (IPPC)
(D) World Organisation for Animal Health (OIE)

11. Arrange the following steps of risk assessment under the SPS framework in the correct sequential order:
1. Risk characterization
2. Hazard identification
3. Exposure assessment
4. Hazard characterization
(A) 1, 2, 3, 4
(B) 2, 4, 3, 1
(C) 2, 3, 4, 1
(D) 4, 3, 2, 1

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12. Which of the following is a correct pair regarding the WTO Agreements and their primary focus?
(A) SPS Agreement - Product quality and packaging design
(B) TRIPS Agreement - Protection of intellectual property rights
(C) TBT Agreement - Prevention of plant pest dissemination
(D) AoA (Agreement on Agriculture) - Establishing microbiological limits

13. A shipment of mangoes from Country A to Country B is rejected because Country B claims there is a risk of fruit fly contamination, despite Country A providing evidence that the mangoes were irradiated to neutralize pests. Which WTO principle allows Country A to challenge Country B's rejection if Country B lacks scientific backing?
(A) Requirement for scientific risk assessment
(B) Most-Favoured-Nation treatment principle
(C) National Treatment regulation obligation
(D) Transparency and notification requirement

14. Which of the following is an incorrect pair regarding the "Three Sisters" of the SPS Agreement?
(A) Codex - Food additives and maximum residue limits
(B) IPPC - Prevention of the spread of plant

pests
(C) WHO - Fixing tariff rates on pharmaceutical products
(D) OIE - Prevention and control of animal diseases

15. What defines "Transparency" in the context of the WTO SPS Agreement?
(A) The requirement to eliminate border inspections for agricultural goods to speed up trade.
(B) The mandatory publication of proprietary corporate formulas by global food manufacturers.
(C) The regulatory requirement to package genetically modified foods in transparent containers.
(D) The obligation of members to notify safety measure changes and establish enquiry points.

16. Which article of the SPS Agreement specifically deals with the provision of Special and Differential Treatment for developing country members?
(A) Article 2
(B) Article 5
(C) Article 10
(D) Article 14

17. Consider the following statements regarding Risk Assessment under the SPS Agreement:
1. Members shall ensure their SPS measures are based on an assessment of risks to human, animal, or plant life.
2. Risk assessment can ignore economic factors such as potential damage in terms of loss of production or sales.
3. Members can choose an appropriate level of protection that differs from international standards.
4. Risk assessments must be conducted by the WTO Dispute Settlement Body.

Which of the above statements is/are correct?
(A) 1 and 3
(B) 2 and 4
(C) 1, 3, and 4
(D) 1, 2, and 3

18. Which of the following is a correct statement regarding the application of the Equivalence principle in food trade?
(A) The importer must automatically accept all of the exporter's measures without any further verification.
(B) Equivalence requires that both trading nations adopt identical food safety laws and regulatory legislation.
(C) The WTO specifies the exact equivalence criteria that must be included in all bilateral trade agreements.
(D) The exporter must demonstrate its measures achieve the importing country's appropriate level of protection.

19. Given below are two statements:
Statement I: Developing countries are granted longer time-frames for compliance with new SPS measures introduced by developed countries.
Statement II: The Special and Differential Treatment clause exempts developing countries entirely from providing scientific justification for their own SPS measures.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

20. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): The SPS Agreement encourages members to harmonize their national standards with international standards.
Reason (R): Harmonization eliminates the need for any border inspection of agricultural commodities between member countries.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

21. Which of the following statements about the OIE (World Organisation for Animal Health) is incorrect?
(A) It sets maximum residue limits for food additives in processed meats.
(B) It serves as the WTO reference organization for animal health standards.
(C) It issues both the Terrestrial and Aquatic Animal Health Codes.

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benchmark. Quantitative limits are developed and adopted by the Codex Alimentarius Commission.

148. (D) Because a country adopts a Codex standard, it is presumed compliant and unlikely to be challenged.
Under the WTO SPS Agreement, when a country aligns its national measures with Codex standards, it benefits from a presumption of conformity. This means its regulations are legally presumed to be scientifically justified and compliant with trade rules, making them highly unlikely to be challenged by other member nations in international trade disputes.

149. (B) The importing country can enforce a stricter limit if it is scientifically justified by a risk assessment.
Under international trade rules, an importing country is legally permitted to enforce a pesticide residue limit that is stricter than the Codex MRL. However, the importing nation must provide clear scientific justification based on a rigorous risk assessment, demonstrating that the stricter national limit is necessary to protect consumer health.

150. (C) To create a level trade playing field while ensuring a high level of consumer health protection.
The ultimate global goal of harmonizing national regulations with Codex standards is to create a level trade playing field while ensuring high consumer health protection. This alignment removes non-tariff trade barriers, prevents food safety disputes, and ensures that all consumers, regardless of region, have access to safe, high-quality food products.

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29. Which of the following is an incorrect pair distinguishing SPS and TBT measures?
(A) TBT measure: Controlling microbial food contamination.
(B) SPS measure: Preventing the spread of animal diseases.
(C) TBT measure: Ensuring food quality and avoiding fraud.
(D) SPS measure: Regulating residues of veterinary drugs.

30. Under the TBT Agreement, what is the definition of a "Standard"?
(A) A mandatory technical regulation or requirement enforced by central government agencies.
(B) A tariff rate or trade quota applied directly to imported technical machinery and equipment.
(C) A document approved by a recognized body providing voluntary rules or guidelines for products.
(D) A legal framework designed for resolving technical trade disputes between member states.

31. Which WTO agreement aims to ensure that technical regulations, standards, and conformity assessment procedures are non-discriminatory and do not create unnecessary obstacles to trade?
(A) Agreement on Trade-Related Investment Measures (TRIMS)
(B) Agreement on Sanitary and Phytosanitary Measures (SPS)
(C) General Agreement on Trade in Services (GATS)
(D) Agreement on Technical Barriers to Trade (TBT)

32. Consider the following statements about Conformity Assessment under the TBT Agreement:
1. It includes procedures used directly or indirectly to determine that relevant requirements in technical regulations or standards are fulfilled.
2. Sampling, testing, and inspection are examples of conformity assessment procedures.
3. The TBT Agreement forbids members from charging any fees for conformity assessment.
4. Conformity assessment procedures must be no more strict than necessary to give the importing member adequate confidence.

Which of the above statements is/are correct?
(A) 1, 2, and 4
(B) 1, 2, and 3
(C) 2, 3, and 4
(D) 1, 3, and 4

33. Which of the following statements correctly highlights a key difference between the SPS and TBT Agreements?
(A) The SPS Agreement allows countries to set standards higher than international norms if scientifically justified, whereas the TBT Agreement prohibits any deviation from international standards.
(B) The SPS Agreement focuses exclusively on human, animal, and plant health, while the TBT Agreement covers all technical regulations, voluntary standards, and conformity assessment procedures.
(C) The SPS Agreement applies only to agricultural products, while the TBT Agreement applies exclusively to industrial manufactured goods.
(D) The SPS Agreement is managed by the United Nations, while the TBT Agreement is managed by the World Trade Organization.

34. Given below are two statements:
Statement I: Both the SPS and TBT agreements require member nations to establish national enquiry points.
Statement II: A measure cannot be covered by both the SPS and TBT Agreements simultaneously; they are mutually exclusive.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

35. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): A requirement for food packaging to be made from biodegradable materials is classified as an SPS measure.
Reason (R): The SPS Agreement regulates measures to protect human health from risks arising from additives, contaminants, toxins, or

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Assertion (A): Private food safety standards like GlobalGAP and BRC are increasingly demanded by major global retailers.
Reason (R): These private standards are legally mandated by the WTO SPS Agreement for all international trade.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

66. Which of the following statements about GlobalGAP is incorrect?
(A) It stands for Global Good Agricultural Practices.
(B) It is a private sector body that sets voluntary standards for the certification of agricultural products around the globe.
(C) It covers areas such as food safety, environmental protection, and workers' health and safety.
(D) It applies exclusively to the processing of heavily manufactured foods like soft drinks and candies.

67. A European supermarket chain refuses to buy fresh grapes from an Indian exporter unless the exporter provides a GlobalGAP certificate. This demand creates a financial burden on the farmers. What is the cause-effect dynamic here?
(A) It creates a de facto market access barrier, though it is not a formal government regulation.
(B) The store enforces a WTO SPS measure, requiring the exporting state to subsidize certification.
(C) The absence of certification implies the agricultural goods contain dangerous contaminant levels.
(D) The exporting business operator can file a formal lawsuit against the supermarket at the WTO.

68. Match the private food safety standards (List I) with their primary focus or origin (List II).
List I: Private Food Safety Standards
P. GlobalGAP
Q. BRCGS (British Retail Consortium)
R. SQF (Safe Quality Food)
S. IFS (International Featured Standards)
List II: Primary Focus or Origin
I. Farm-to-fork certification program recognized by GFSI
II. Standard focusing on good agricultural practices at the farm level
III. Standard originally developed by UK retailers for food manufacturers
IV. Standard developed by German and French retailers for auditing food manufacturers
(A) P-II, Q-III, R-I, S-IV
(B) P-I, Q-II, R-III, S-IV
(C) P-II, Q-I, R-IV, S-III
(D) P-III, Q-II, R-I, S-IV

69. What is the most appropriate definition of the Global Food Safety Initiative (GFSI)?
(A) A global industry coalition that benchmarks and recognizes food safety certification programs.
(B) A United Nations agency responsible for enforcing binding international laws on food safety.
(C) A major financial institution offering low-interest loans to food exporters in developing states.
(D) A regional rapid alert network utilized exclusively in North America to manage urgent food recalls.

70. All of the following are major challenges faced by Indian food exporters under international standards EXCEPT:
(A) High costs associated with multiple third-party certifications.
(B) Frequent changes in the Maximum Residue Limits (MRLs) established by importing countries.
(C) Complex administrative procedures and documentation required for traceability.
(D) Lack of access to any NABL accredited laboratories within the Indian subcontinent.

71. Arrange the hierarchy of standardization and accreditation in the correct logical sequence from lowest to highest authority:
1. Accredited Testing Laboratory
2. Accreditation Body (e.g., NABL)
3. International Laboratory Accreditation Cooperation (ILAC)
4. Standard Setting Body (e.g., ISO)
(A) 1, 2, 3, 4
(B) 4, 1, 2, 3
(C) 1, 2, 4, 3
(D) 4, 3, 2, 1

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43. Country A imposes a ban on the import of genetically modified (GM) corn from Country B, claiming it is unnatural, despite an international scientific consensus and their own risk assessment showing it poses no greater risk than conventional corn. Country B challenges this at the WTO. Based on the SPS Agreement, what is the likely outcome?
(A) The ban will be upheld because GM food is always considered inherently hazardous.
(B) The ban will be struck down because it is not based on scientific principles and a proper risk assessment.
(C) The ban will be upheld because the TBT agreement allows countries to ban products they deem culturally inappropriate.
(D) The WTO will order Country B to stop producing GM corn immediately.

44. Which of the following is an incorrect pair regarding acronyms in food trade?
(A) RASFF - Rapid Alert System for Food and Feed
(B) MRA - Mandatory Risk Assessment
(C) NTB - Non-Tariff Barrier
(D) ILAC - International Laboratory Accreditation Cooperation

45. How does the Rapid Alert System for Food and Feed (RASFF) primarily function in the European Union?
(A) It allows member states to rapidly share information when a food safety risk is detected.
(B) It issues direct financial agricultural subsidies to farmers affected by major weather disasters.
(C) It regulates and controls the stock market prices of food commodities within European markets.
(D) It functions as an academic body publishing peer-reviewed journals on advanced microbiology.

46. What is a common reason for import refusals and food safety alerts affecting Indian exports in the European Union?
(A) Excessive protein content detected in Indian cereal exports.
(B) Over-compliance with the EU's stringent organic labelling regulations.
(C) Pesticide residues exceeding EU Maximum Residue Levels in spices and rice.
(D) The use of heavy, non-recyclable shipping crates for fresh fruits.

47. Consider the following statements about RASFF notifications:
1. Alert notifications are sent when a food or feed presenting a serious risk is on the market and rapid action is required.
2. Border rejection notifications concern food and feed consignments that have been tested and rejected at the external borders of the EU.
3. Information notifications are used when a risk has been identified, but the product is no longer on the market or the risk does not require rapid action in other member countries.
4. RASFF notifications only apply to products imported from outside the EU, never to intra-EU trade.

Which of the above statements is/are correct?
(A) 1, 2, and 3
(B) 1, 3, and 4
(C) 1, 2, and 3
(D) 2, 3, and 4

48. Which of the following is a correct statement regarding the impact of border rejections on an exporting country like India?
(A) It results in an automatic, permanent lifetime ban on all food exports from that country.
(B) It increases the profits of exporters because rejected goods are resold at local premiums.
(C) It damages export reputation and leads to increased testing of subsequent shipments.
(D) It suspends the need to comply with foreign safety standards for a one-year grace period.

49. Given below are two statements:
Statement I: The International Accreditation Forum (IAF) is the global association of accreditation bodies focusing on conformity assessment in the fields of management systems, products, services, and personnel.
Statement II: The International Laboratory Accreditation Cooperation (ILAC) specifically focuses on the accreditation of testing and calibration laboratories and inspection bodies.
(A) Both Statement I and Statement II are

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disease-causing organisms in food.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

36. Which of the following statements about Non-Tariff Barriers (NTBs) in food trade is incorrect?
(A) NTBs include import quotas, embargoes, and unjustifiably strict sanitary requirements.
(B) Technical regulations act as NTBs if they are designed primarily to protect domestic markets.
(C) All NTBs are strictly illegal under WTO rules, regardless of health or safety justifications.
(D) Complex and costly certification procedures function as NTBs, especially for developing states.

37. A country heavily subsidizes its domestic food testing laboratories, leading to significantly lower testing costs for domestic products compared to imported products, which face exorbitant conformity assessment fees at the border. What is the effect on international trade?
(A) It acts as a Non-Tariff Barrier by discriminating against imports.
(B) It encourages fair competition and lowers prices for consumers.
(C) It directly fulfills the Equivalence principle of the SPS agreement.
(D) It aligns completely with standard Most-Favoured-Nation principles.

38. Match the type of barrier (List I) with its specific example in food trade (List II).
List I: Types of Barrier
P. Tariff Barrier
Q. SPS Measure
R. TBT Measure
S. Non-Tariff Quota
List II: Examples in Food Trade
I. A limit of 10,000 tonnes on the import of sugar per year
II. A 15% ad valorem import duty on processed cheese
III. A mandatory requirement that fruit juices must state the percentage of real fruit juice on the label
IV. A ban on meat imports originating from a region endemic for African Swine Fever
(A) P-II, Q-IV, R-III, S-I
(B) P-I, Q-III, R-IV, S-II
(C) P-II, Q-III, R-IV, S-I
(D) P-IV, Q-II, R-I, S-III

39. What is the most appropriate mechanism within the WTO to resolve a situation where Country A believes Country B has imposed a food safety regulation that violates the SPS Agreement?
(A) Initiating unilateral military action against the violating partner.
(B) Seeking a formal ruling through the WTO Dispute Settlement Body.
(C) Appealing directly to the International Court of Justice in The Hague.
(D) Suspending all bilateral diplomatic relations and treaties immediately.

40. All of the following are common grounds for trade disputes involving food safety and labelling measures at the WTO, EXCEPT:
(A) Lack of scientific evidence justifying a phytosanitary import ban.
(B) Discriminatory taxation on imported foods based on packaging labels.
(C) Disagreements over font colors for promotional soft drink marketing.
(D) Unjustified procedural delays in approving imported food products.

41. Arrange the following steps of the WTO Dispute Settlement process in the correct sequence:
1. Establishment of a Dispute Settlement Panel
2. Consultations between the disputing parties
3. Appellate Body review (if appealed)
4. Implementation of the ruling and potential retaliation
(A) 2, 1, 3, 4
(B) 1, 2, 3, 4
(C) 2, 3, 1, 4
(D) 1, 3, 2, 4

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42. Which of the following is a correct pair regarding prominent international food trade disputes?
(A) US-Clove Cigarettes case - Dispute over the ban on flavoured tobacco products under TBT
(B) EC-Hormones case - Dispute over technical regulations on cheese packaging
(C) Japan-Apples case - Dispute over intellectual property rights of apple varieties
(D) India-Agricultural Products case - Dispute

57. Which of the following is a correct pair regarding ISO standards?
(A) ISO/IEC 17025 - Environmental Management Systems
(B) ISO 9001 - Competence of testing laboratories
(C) ISO 14001 - Requirements for product certification bodies
(D) ISO 22000 - Food Safety Management Systems

58. A laboratory tests a batch of spices for Salmonella and releases a report. However, the laboratory's equipment was not calibrated against a national standard, and the personnel lacked documented training. Which specific international standard does this laboratory fail to comply with?
(A) ISO/IEC 17025
(B) ISO 14001
(C) Codex General Standard for Food Additives
(D) ISO/IEC 17065

59. Which of the following is an incorrect pair regarding accreditation in India?
(A) NABL - National Accreditation Board for Testing and Calibration Laboratories
(B) FSSAI - Foreign Standard-Setting and Accreditation Institution
(C) QCI - Quality Council of India
(D) NABCB - National Accreditation Board for Certification Bodies

60. What is the definition of "Proficiency Testing" in the context of laboratory accreditation?
(A) Evaluation of performance against pre-set criteria via inter-laboratory comparisons.
(B) Evaluation of performance against pre-set criteria via inter-laboratory comparisons.
(C) Evaluating the overall physical strength and durability of various packaging materials.
(D) A comprehensive financial audit assessing a testing facility's annual profitability.

61. Which organization is responsible for providing accreditation to food testing laboratories in India to ensure they meet ISO/IEC 17025 requirements?
(A) National Accreditation Board for Testing and Calibration Laboratories (NABL)
(B) Bureau of Indian Standards (BIS)
(C) Export Inspection Council (EIC)
(D) Agricultural and Processed Food Products Export Development Authority (APEDA)

62. Consider the following statements regarding the NABL accreditation process for food testing laboratories:
1. Accreditation is granted for a specific scope of testing, not a blanket approval for all tests.
2. The laboratory must participate in proficiency testing programs to demonstrate competence.
3. NABL accreditation is mandatory for all primary food producers (farmers) in India.
4. NABL conducts on-site assessments to verify compliance with ISO/IEC 17025.

Which of the above statements is/are correct?
(A) 1, 2, and 3
(B) 1, 2, and 4
(C) 2, 3, and 4
(D) 1, 3, and 4

63. Which of the following is a correct statement regarding Inter-Laboratory Comparisons (ILC)?
(A) It is a process used exclusively to share proprietary food recipes between competing companies.
(B) It completely replaces the need for standard internal laboratory quality control measures.
(C) It requires independent testing laboratories to merge their corporate and management structures.
(D) It involves conducting and evaluating measurements on similar items by multiple laboratories.

64. Given below are two statements:
Statement I: Third-party certification involves an independent organization assessing and declaring that a product, process, or service meets specific standards.
Statement II: First-party certification refers to an assessment performed by the purchaser or customer of the product.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

65. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).

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(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

96. Which of the following statements about Mutual Recognition Arrangements (MRAs) is incorrect?
(A) They ensure accredited test reports are accepted across borders.
(B) They are based on peer assessments of national accreditation bodies.
(C) They mandate that signatory nations merge their political boundaries.
(D) They build global confidence in conformity assessment bodies.

97. An Indian laboratory tests a shipment of tea for pesticide residues. The laboratory is accredited by NABL. The European importer accepts the test report without requiring re-testing in Europe. This smooth transaction is primarily a direct effect of:
(A) The European Union dropping all SPS requirements for Indian tea.
(B) NABL's signatory status to the ILAC Mutual Recognition Arrangement.
(C) The WTO directly validating the specific test report.
(D) The tea being exempted from pesticide residue limits under GlobalGAP.

98. Match the ISO standard (List I) with its corresponding application area (List II).
List I: ISO Standard
P. ISO 9001
Q. ISO/IEC 17025
R. ISO/IEC 17065
S. ISO 22000
List II: Corresponding Application Area
I. Food safety management systems
II. Competence of testing and calibration laboratories
III. Quality management systems
IV. Requirements for bodies certifying products, processes, and services
(A) P-III, Q-II, R-IV, S-I
(B) P-I, Q-II, R-III, S-IV
(C) P-III, Q-IV, R-II, S-I
(D) P-II, Q-III, R-I, S-IV

99. What is the most appropriate reason why a food processing company would seek BRCGS Food Safety certification?
(A) To satisfy global retailers who demand GFSI-recognized certifications.
(B) To comply with direct legal mandates issued by the WTO SPS Committee.
(C) To secure absolute exemptions from paying national corporate taxes.
(D) To bypass food safety laws enforced by local health departments.

100. All of the following are benefits of participating in Proficiency Testing (PT) for a food laboratory EXCEPT:
(A) Identifying testing problems and initiating corrective actions.
(B) Demonstrating competence to clients and accreditation bodies.
(C) Guaranteeing zero errors in all future routine testing.
(D) Comparing the laboratory's performance with other laboratories.

101. Arrange the general steps for obtaining ISO/IEC 17025 accreditation in the correct sequence:
1. Implementation of the management system and generation of records
2. Final grant of accreditation by the accreditation body
3. Application submission to the accreditation body (e.g., NABL)
4. On-site assessment and closure of non-conformities
(A) 3, 1, 4, 2
(B) 1, 3, 4, 2
(C) 1, 4, 3, 2
(D) 3, 4, 1, 2

102. Which of the following is a correct pair related to the RASFF framework?
(A) Border Rejection - Product clears customs smoothly without inspection
(B) Information - Demands immediate product recall across global markets
(C) News Notification - Pertains solely to regional tariff rate changes
(D) Alert Notification - Serious risk on the market requiring rapid action

103. A container of basmati rice from India is rejected at a European port because tests reveal the presence of Tricyclazole above the EU's MRL of

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72. Which of the following is a correct pair regarding food certification and its scope?
(A) ISO/IEC 17025 - Certification of final consumer products
(B) ISO 9001 - Certification of farm-level agricultural methods
(C) BRCGS Food Safety - Auditing of food processing facilities
(D) GlobalGAP - Calibration of analytical testing equipment

73. An Indian exporter ships a consignment of spices to the EU. The consignment is flagged under RASFF due to the presence of ethylene oxide exceeding the MRL. What immediate action is the EU most likely to take?
(A) Approve the contaminated shipment but impose a high retaliatory tariff.
(B) Request the WTO to mediate and set a new, specific MRL for the exporter.
(C) Dilute the spices with clean domestic products to lower chemical levels.
(D) Reject the shipment at the border and issue a rapid alert to EU members.

74. Which of the following is an incorrect pair regarding the scope of WTO agreements?
(A) SPS Agreement - Dimensions of shipping containers
(B) SPS Agreement - Regulations on food additives
(C) TBT Agreement - Nutritional labelling formats
(D) TBT Agreement - Shape and design of packaging

75. What defines "Metrological Traceability" in the context of ISO/IEC 17025?
(A) Tracking food products through all stages of production from farm to consumer shelf.
(B) Relating a result to a reference standard via an unbroken chain of calibrations.
(C) Auditing and cross-referencing the internal financial records of a laboratory.
(D) The formal legal framework for patenting a newly developed chemical testing method.

76. In the context of international trade, what does the term "Harmonization" refer to?
(A) The establishment of global trade monopolies and joint ventures by corporations.
(B) Basing national measures on international standards, guidelines, or recommendations.
(C) The complete and permanent elimination of border controls and customs tariffs globally.
(D) The synchronization of agricultural planting and harvest seasons across hemispheres.

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77. Consider the following statements about the Agreement on Technical Barriers to Trade (TBT):
1. It applies to industrial products only, excluding agricultural products completely.
2. It strongly encourages members to base their technical regulations on international standards.
3. It allows members to protect legitimate objectives such as human health or safety, animal or plant life, and the environment.
4. It requires that technical regulations are not more trade-restrictive than necessary to fulfill a legitimate objective.

Which of the above statements is/are correct?
(A) 1, 2, and 3
(B) 2, 3, and 4
(C) 1, 3, and 4
(D) 1, 2, and 4

78. Which of the following is a correct statement regarding the Codex Alimentarius Commission?
(A) Its standards are legally binding and supersede national laws automatically.
(B) It deals exclusively with technical regulations for packaging materials.
(C) It was established jointly by the FAO and the WHO.
(D) It is a subsidiary body of the WTO Dispute Settlement Body.

79. Given below are two statements:
Statement I: Under the TBT Agreement, countries must notify other members when proposing technical regulations that may significantly affect trade, provided no relevant international standard exists.
Statement II: The SPS Agreement does not require any notification to trading partners when a country changes its food safety standards.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

50. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Mutual Recognition Arrangements (MRAs) facilitate international trade by allowing test reports and certificates from an accredited body in one country to be recognized in another.
Reason (R): MRAs require all participating countries to adopt identical domestic political systems.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

51. Which of the following statements about MRAs in laboratory accreditation is incorrect?
(A) They are signed only by developing states to bypass WTO trade rules.
(B) They aim to realize the principle of "tested once, accepted globally."
(C) They help significantly lower technical barriers to international trade.
(D) They rely on peer evaluation programs among national accrediting bodies.

52. An exporter faces delays because the importing country does not trust the safety certificate issued by the exporter's local laboratory. If the local laboratory's accreditation body becomes a signatory to an ILAC Mutual Recognition Arrangement, what is the effect on the exporter?
(A) The exporting firm must construct a brand-new testing laboratory inside the importing nation.
(B) The exporter will face higher tariff rates to offset the administrative costs of re-testing.
(C) The importer is more likely to accept the results, reducing testing costs and delays.
(D) The domestic laboratory will automatically lose its legal right to analyze any local products.

53. Match the organizations (List I) with their primary accreditation focus (List II).
List I: Organizations
P. ILAC
Q. IAF
R. NABL
S. ISO
List II: Primary Accreditation Focus
I. Global accreditation for management systems and products
II. Global standard-setting organization
III. Global accreditation for testing, calibration, and inspection
IV. National accreditation body for laboratories in India
(A) P-III, Q-I, R-IV, S-II
(B) P-I, Q-III, R-II, S-IV
(C) P-III, Q-IV, R-I, S-II
(D) P-I, Q-II, R-IV, S-III

54. What is the most appropriate description of the ISO/IEC 17025 standard?
(A) Requirements for bodies providing audit and certification of management systems.
(B) Requirements for conformity assessment and product certification bodies.
(C) Guidelines for auditing environmental management systems.
(D) General requirements for the competence of testing and calibration laboratories.

55. All of the following are core requirements for a laboratory to achieve ISO/IEC 17025 accreditation EXCEPT:
(A) Impartiality and confidentiality
(B) Requirement to manufacture and sell analytical instruments
(C) Structural requirements defining the organization and management
(D) Resource requirements including personnel, facilities, and equipment

56. Based on the concept of international accreditation, how does a conformity assessment body prove its competence to carry out product certification?
(A) By obtaining accreditation under ISO 9001.
(B) By registering as an exporter with the local chamber of commerce.
(C) By obtaining accreditation under ISO/IEC 17065.
(D) By submitting a written declaration to the WTO.

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(D) WTO - Headquartered in New York, USA

88. A batch of imported honey is detained because it lacks the mandatory "Organic" certification logo conforming strictly to the importing country's design and color specifications. What type of measure is causing this detention?
(A) An SPS measure, because honey is an agricultural food product meant for human intake.
(B) A TRIPS measure, because it concerns copyright protection of the specific logo design.
(C) A TBT measure, because it involves labelling and quality standards unrelated to safety.
(D) An Anti-dumping measure, because the food product is sold below normal market values.

89. Which of the following is an incorrect pair regarding the impact of non-tariff barriers (NTBs)?
(A) Stringent testing protocols - Increases compliance costs for exporters
(B) Lack of transparency in regulations - Creates uncertainty for foreign suppliers
(C) Complex certification requirements - Acts as a barrier for small and medium enterprises
(D) Unpredictable customs valuation - Facilitates smooth and rapid trade

90. What defines a "Conformity Assessment Procedure" under the WTO agreements?
(A) A procedure used to determine if technical regulations or standards are fulfilled.
(B) The economic process of aligning domestic currency values directly with the US Dollar.
(C) The bilateral negotiation process to lower import tariffs on agricultural food goods.
(D) A legal compliance assessment conducted by the WTO to penalize non-compliant nations.

91. Which article of the GATT 1994 provides the general exceptions that form the basis for the SPS Agreement, allowing measures necessary to protect human, animal, or plant life?
(A) Article I
(B) Article III
(C) Article XI
(D) Article XX(b)

92. Consider the following statements regarding the Precautionary Principle in the SPS Agreement:
1. It is explicitly outlined in Article 5.7 of the SPS Agreement.
2. It allows members to provisionally adopt SPS measures when relevant scientific evidence is insufficient.
3. Such provisional measures can be maintained permanently without further research.
4. Members must seek to obtain the additional information necessary for a more objective assessment within a reasonable period.

Which of the above statements is/are correct?
(A) 1, 2, and 4
(B) 1, 2, and 3
(C) 2, 3, and 4
(D) 1, 3, and 4

93. Which of the following is a correct statement regarding the Codex Alimentarius?
(A) It sets standards for food hygiene, additives, and residues of pesticides or drugs.
(B) It provides trade guidelines exclusively for the export of heavy industrial machinery.
(C) Its standards are mandatory and legally enforceable by the United Nations security.
(D) It completely excludes developing countries from participating in standard sessions.

94. Given below are two statements:
Statement I: The International Plant Protection Convention (IPPC) aims to prevent the introduction and spread of plant pests and diseases.
Statement II: The IPPC provides a framework for the establishment of Phytosanitary Certificates used in international trade.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

95. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Conformity assessment bodies must operate impartially and maintain the confidentiality of the information obtained during certification activities.
Reason (R): ISO/IEC 17065 mandates impartiality and confidentiality to ensure trust and objectivity in the certification process.

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80. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): The SPS Agreement allows countries to adopt measures that result in a higher level of protection than international standards.
Reason (R): Members are permitted to deviate from international standards if there is scientific justification based on a risk assessment.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

81. Which of the following statements about the "Appropriate Level of Protection" (ALOP) under the SPS Agreement is incorrect?
(A) It is the level of protection deemed appropriate by the member establishing an SPS measure.
(B) It must be uniform across all member countries of the WTO.
(C) It is also referred to as the "acceptable level of risk."
(D) Members must be consistent in their application of ALOP to avoid arbitrary discrimination.

82. An exporting country successfully proves that its heat-treatment process for milk eliminates bacterial pathogens just as effectively as the pasteurization process mandated by the importing country. If the importing country accepts this heat-treatment for market access, which SPS principle is being applied?
(A) National Treatment
(B) Regionalization
(C) Harmonization
(D) Equivalence

83. Match the specific SPS measure (List I) with its objective (List II).
List I: Specific SPS Measure
P. Setting Maximum Residue Limits (MRLs) for pesticides
Q. Requiring phytosanitary certificates for imported timber
R. Banning meat imports from foot-and-mouth endemic zones
S. Inspecting imported food for Salmonella
List II: Objective
I. Protecting animal health
II. Protecting human health from foodborne diseases
III. Protecting human health from chemical risks
IV. Protecting plant life from pests
(A) P-III, Q-IV, R-I, S-II
(B) P-II, Q-IV, R-I, S-III
(C) P-III, Q-I, R-IV, S-II
(D) P-IV, Q-III, R-II, S-I

84. What is the best description of "Regionalization" (or adaptation to regional conditions) under the SPS Agreement?
(A) Grouping adjacent countries into regional economic blocs that share uniform customs tariffs.
(B) Mandating that all countries within a geographic region adopt identical food safety rules.
(C) Allowing trade from pest-free areas of a country, even if other parts are affected.
(D) Allowing regional standard-setting associations to unilaterally override WTO regulations.

85. All of the following are examples of legitimate objectives that justify a technical regulation under the TBT Agreement EXCEPT:
(A) Protecting domestic industries from foreign competition
(B) Protecting essential national security requirements
(C) Preventing deceptive trade and marketing practices
(D) Protecting human health, wellness, or safety

86. A developing nation lacks the technical infrastructure to immediately comply with a newly established international pesticide limit. Which concept under the SPS Agreement addresses this issue?
(A) The Precautionary Principle
(B) The Most-Favoured-Nation Clause
(C) The Dispute Settlement Mechanism
(D) Special and Differential Treatment

87. Which of the following is a correct pair regarding international trade bodies?
(A) OIE - Established and based in Rome, Italy
(B) IPPC - Hosted by the FAO in Rome, Italy
(C) Codex - Headquartered in Geneva, Switzerland

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0.01 mg/kg. What is the regulatory basis for the EU's rejection?
(A) The EU is applying a TBT measure to protect its domestic rice industry.
(B) The EU is applying an SPS measure to protect health from chemical residues.
(C) The EU is applying a TRIPS measure because Tricyclazole is a patented formula.
(D) The EU is applying an anti-dumping duty because the rice is sold too cheaply.

104. Which of the following is an incorrect pair regarding acronyms?
(A) GFSI - Global Food Safety Initiative
(B) SQF - Safe Quality Food
(C) FSSAI - Food Standard and Safety Authority International
(D) APEDA - Agricultural and Processed Food Products Export Development Authority

105. What defines "Third-Party Certification" in the food industry?
(A) An internal audit conducted by the firm's own quality assurance team.
(B) An audit performed directly by a customer on a supplier's facility.
(C) A financial certification provided by the government's tax office.
(D) An assessment by an independent accredited body verifying compliance.

106. In the context of WTO Agreements, what does the term "National Treatment" mean?
(A) Imported goods must be treated as favourably as domestic goods within the market.
(B) Nations must treat all trading partners with custom tariffs based on political ties.
(C) National laws always completely override international trade rules during a dispute.
(D) Only native citizens have the legal right to consume domestically produced foods.

107. Consider the following statements about the differences between SPS and TBT agreements:
1. SPS measures focus on the purpose of the measure (protecting health), whereas TBT measures focus on the nature of the measure (technical regulations, standards).
2. TBT allows measures based on consumer preference and packaging design, while SPS strictly requires scientific risk assessment.
3. Both agreements prohibit discrimination between imported and domestic products.
4. A labelling requirement strictly related to food safety (e.g., allergen warning) falls under the TBT agreement.

Which of the above statements is/are correct?
(A) 1, 2, and 3
(B) 1, 3, and 4
(C) 2, 3, and 4
(D) 1, 2, and 4

108. Which of the following is a correct statement regarding standard-setting in international trade?
(A) The WTO dictates the exact scientific protocols that Codex must use to establish MRLs.
(B) The OIE establishes international standards and guidelines for animal health and zoonoses.
(C) The ISO sets mandatory international laws for food safety that all governments must adopt.
(D) The IPPC establishes global standards for the nutritional labeling of processed foods.

109. Given below are two statements:
Statement I: If a country adopts a food safety standard identical to a Codex standard, it is presumed to be consistent with the SPS Agreement.
Statement II: If a country chooses a stricter standard than Codex, it is automatically deemed illegal under the WTO.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

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110. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): The SPS Agreement applies to measures intended to protect human health from diseases carried by animals or plants.
Reason (R): Zoonotic diseases can cross borders through international trade of live animals and animal products.
(A) Both A and R are true and R is the correct explanation of A.

(B) It offers its own direct certification audits to food manufacturing sites.
(C) It operates as a formal regulatory body established by the United Nations.
(D) It evaluates the overall financial stability of global supermarket chains.

142. Given below are two statements:
Statement I: The ISO/IEC 17025 standard requires a laboratory to have a process to evaluate the significance of nonconforming work and take corrective actions.
Statement II: A laboratory accredited to ISO/IEC 17025 is not required to participate in any inter-laboratory comparisons if it performs daily internal calibrations.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

143. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Developing countries often struggle to comply with the stringent private food safety standards imposed by international retailers.
Reason (R): Complying with private standards like GlobalGAP requires significant financial investment, documentation, and technical expertise that small-scale farmers often lack.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

144. Which of the following statements regarding the WTO Agreement on Agriculture (AoA) in relation to the SPS Agreement is incorrect?
(A) While AoA deals with market access, domestic support, and export subsidies, SPS deals with health and safety barriers.
(B) Both agreements were negotiated during the Uruguay Round of GATT.
(C) The AoA overrides the SPS Agreement, meaning safety measures cannot restrict agricultural market access under any circumstance.
(D) The SPS Agreement aims to ensure that SPS measures are not used as disguised protectionism to circumvent AoA market access commitments.

145. A laboratory is assessing the measurement uncertainty of a chemical test for detecting lead in spices. Why is evaluating measurement uncertainty critical under ISO/IEC 17025?
(A) It legally protects the laboratory from any criminal prosecution if the results are fake.
(B) It provides a quantitative indication of the quality and reliability of the test result.
(C) It allows the laboratory to charge higher fees for testing.
(D) It eliminates the need for calibrating analytical equipment.

146. Match the specific trade barrier (List I) with its classification (List II).
List I: Specific Trade Barrier
P. A 10% tax on imported chocolates
Q. A complex, non-transparent certification process for imported honey
R. A ban on poultry imports due to Avian Influenza
S. A mandatory requirement that wine bottles must hold exactly 750ml
List II: Classification
I. TBT Measure
II. Tariff Barrier
III. SPS Measure
IV. Non-Tariff Barrier (procedural)
(A) P-II, Q-IV, R-III, S-I
(B) P-I, Q-II, R-III, S-IV
(C) P-II, Q-III, R-IV, S-I
(D) P-III, Q-IV, R-I, S-II

147. What is the most appropriate action for an Indian food business operator seeking to build international buyer confidence in their organic product claims?
(A) Obtaining certification from an accredited ISO/IEC 17065 body.
(B) Publishing a formal organic self-declaration on their website.
(C) Registering a protective trademark for the word organic in India.
(D) Increasing the retail price of the food to signal high quality.

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machine. According to ISO/IEC 17025, what immediate action must the laboratory take before using the equipment for accredited testing?
(A) Submit a request for an immediate on-site facility audit from ILAC.
(B) Exclude all HPLC assays from the scope of their formal accreditation.
(C) Inform the WTO SPS committee about the laboratory equipment upgrade.
(D) Calibrate the equipment to establish metrological traceability.

119. Which of the following is an incorrect pair regarding trade agreements and their components?
(A) SPS Agreement - Annex A (Definitions)
(B) TBT Agreement - Establishment of global Maximum Residue Limits (MRLs)
(C) SPS Agreement - Annex B (Transparency of SPS Regulations)
(D) TBT Agreement - Code of Good Practice for the Preparation, Adoption and Application of Standards

120. What defines the term "Standard" under the TBT Agreement, in contrast to a "Technical Regulation"?
(A) Compliance with a standard is mandatory.
(B) A standard only applies to services, not physical products.
(C) Compliance with a standard is voluntary.
(D) A standard is set exclusively by the government, never by private entities.

121. Arrange the hierarchy of documentation in a typical ISO/IEC 17025 compliant laboratory quality management system from top to bottom:
1. Standard Operating Procedures (SOPs)
2. Quality Manual / Policies
3. Records and Formats
4. Work Instructions

(A) 2, 1, 4, 3
(B) 1, 2, 3, 4
(C) 2, 4, 1, 3
(D) 4, 1, 2, 3

122. Which of the following is a correct statement regarding the application of the Most-Favoured-Nation (MFN) principle in the WTO context?
(A) Nations must grant equal trade advantages to all WTO members without discrimination.
(B) It allows countries to impose randomly varying tariffs based on daily political ties.
(C) It applies exclusively to developed nations and completely exempts developing states.
(D) It mandates that all member nations adopt a single, unified global trading currency.

123. A WTO member detects a new, unknown pest on imported fruits. Science cannot yet confirm the pest's potential damage. The member places a temporary ban on the fruits. Under what specific provision of the SPS Agreement is this action justified?
(A) Article 2: Basic Rights and Duties
(B) Article 3: Standard Harmonization
(C) Article 5.7: Provisional measures
(D) Article 6: Regional Adaptation

124. Which of the following is an incorrect pair?
(A) OIE - Terrestrial Animal Health Code
(B) ISO - Enforcer of WTO Trade Disputes
(C) IPPC - International Standards for Phytosanitary Measures (ISPMs)
(D) Codex - General Standard for Food Additives (GSFA)

125. What is the primary purpose of an Enquiry Point established under the SPS and TBT agreements?
(A) To answer inquiries and provide documents on adopted or proposed measures.
(B) To conduct criminal law investigations regarding intentional food adulteration.
(C) To act as the primary testing laboratory analyzing import goods at borders.
(D) To manage and distribute agricultural financial subsidies to local farmers.

126. Consider the following statements regarding the challenges for Indian food exporters under international standards:
1. Meeting stringent private standards like SQF or BRC adds significantly to the cost of production and processing.
2. Fragmented landholdings make it difficult to implement traceability systems required by global standards.
3. Importing countries frequently harmonize their standards downward to accommodate Indian exports.
4. Variations in MRLs between India and importing countries often lead to export rejections.

Which of the above statements is/are correct?
(A) 1, 2, and 4
(B) 1, 2, and 3

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(C) 2, 3, and 4
(D) 1, 3, and 4

127. Which of the following is a correct statement regarding ISO/IEC 17065?
(A) It dictates the maximum legally allowed concentrations of heavy metal residues in consumer foods.
(B) It outlines detailed sanitary and hygienic engineering guidelines for regional slaughterhouses.
(C) It is a formal strategic regulatory agreement signed directly between the WTO and the WHO.
(D) It specifies requirements for the competence and impartiality of product certification bodies.

128. Given below are two statements:
Statement I: The Dispute Settlement Body (DSB) of the WTO has the authority to authorize retaliation if a member fails to comply with a ruling.
Statement II: The DSB relies exclusively on the scientific expertise of the ISO when dealing with SPS disputes.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

129. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): The SPS Agreement encourages transparency by requiring members to publish their regulations promptly.
Reason (R): Transparency prevents secret or unnotified regulations from being used as disguised restrictions on international trade.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

130. Which of the following statements about Conformity Assessment under ISO/IEC 17065 is incorrect?
(A) The certification body must have a legally enforceable agreement for the provision of certification activities to its clients.
(B) The certification body can offer consultancy services to the same client it is certifying to increase revenue.
(C) The certification body must employ competent personnel to evaluate the product.
(D) The certification decision must be made by a person or group different from those who carried out the evaluation.

131. A conformity assessment body evaluates an organic farm and issues a certificate. Later, it is discovered that the lead auditor owned shares in the farm. This scenario primarily violates which core principle of ISO/IEC 17065?
(A) Impartiality
(B) Confidentiality
(C) Technical competence
(D) Openness

132. Match the specific requirement (List I) with the relevant international framework (List II).
List I: Specific Requirement
P. Metrological Traceability
Q. Scientific Risk Assessment
R. Impartiality of Product Certification
S. Notification of Technical Regulations
List II: Relevant International Framework
I. SPS Agreement
II. TBT Agreement
III. ISO/IEC 17025
IV. ISO/IEC 17065
(A) P-III, Q-I, R-IV, S-II
(B) P-I, Q-II, R-III, S-IV
(C) P-IV, Q-I, R-III, S-II
(D) P-III, Q-IV, R-I, S-II

133. What is the most appropriate description of an "Equivalence Agreement" between two countries?
(A) An agreement recognizing that different measures achieve the same level of sanitary protection.
(B) A formal treaty to charge identical customs tariff duties on all categories of imported goods.
(C) A bilateral trade pact to eliminate all border inspection checks for a fixed ten-year period.

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(D) A strategic partnership to exchange military technology directly for essential food supplies.

134. All of the following are consequences of lacking MRA (Mutual Recognition Arrangement) coverage for an exporting country EXCEPT:
(A) Multiple product tests at export and import stages.
(B) Increased delays at customs border check points.
(C) Higher overall transaction costs for exporters.
(D) Automatic acceptance of the exporter's lab results.

135. Arrange the procedural steps in resolving an SPS trade dispute at the WTO in the correct sequence:
1. Ruling by the Dispute Settlement Panel
2. Appeal to the Appellate Body
3. Request for Consultations
4. Implementation or Retaliation

(A) 3, 1, 2, 4
(B) 1, 2, 3, 4
(C) 3, 2, 1, 4
(D) 1, 3, 2, 4

136. Which of the following is a correct pair regarding SPS measures and their examples?
(A) Technical regulation - Mandating wrapper font types
(B) Quality standard - Demanding spherical imported apples
(C) Disease control - Banning live pigs from Swine Fever zones
(D) Traceability - Requiring green colored outer packages

137. An agricultural exporter in India faces a rejection of grapes in the EU due to Chlormequat residue. The EU MRL is 0.05 ppm, while the Codex MRL is 0.5 ppm. The EU defends its standard based on its dietary risk assessment. Under WTO rules, is the EU allowed to do this?
(A) No, because WTO member states must strictly adhere to all Codex standards without exception.
(B) No, because pesticide residue limits are governed by the TBT Agreement rather than the SPS.
(C) Yes, but only if the EU provides direct financial compensation to the affected exporters.
(D) Yes, provided the EU has scientific justification and a risk assessment supporting its standard.

138. Which of the following is an incorrect pair regarding the "Three Sisters" standard-setting bodies?
(A) IPPC - Promotes intellectual property rights for new plant varieties
(B) Codex - Promotes consumer health and fair practices in food trade
(C) OIE - Promotes animal health globally
(D) IPPC - Protects cultivated and wild plants by preventing the introduction of pests

139. What defines "Special and Differential Treatment" (S&DT) in the WTO Agreements?
(A) Regulatory rules designed to grant preferential market access benefits strictly to developed nations.
(B) Provisions giving developing countries longer compliance times and safeguarding their trade.
(C) The sovereign right of any member state to impose immediate custom tariffs on partners without cause.
(D) A legal mandate forcing developing countries to adopt stricter food safety measures than others.

140. Consider the following statements about the Rapid Alert System for Food and Feed (RASFF):
1. It is a network connecting food safety authorities in the EU, the European Commission, and EFSA.
2. It allows for the rapid exchange of information about health risks related to food and feed.
3. If a serious risk is found, a RASFF alert can trigger the withdrawal or recall of the product from the market.
4. RASFF covers risks related strictly to human health and entirely excludes animal feed risks.

Which of the above statements is/are correct?
(A) 1, 2, and 4
(B) 1, 2, and 3
(C) 2, 3, and 4
(D) 1, 3, and 4

141. Which of the following is a correct statement regarding GFSI (Global Food Safety Initiative)?
(A) It benchmarks existing safety standards against globally recognized criteria.

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ANSWERS

1. (B) 1 January 1995
The World Trade Organization officially began operations on this date, following the Marrakesh Agreement which replaced the General Agreement on Tariffs and Trade. This transition created a permanent institutional framework to oversee global trade rules, manage trade disputes, and facilitate ongoing multilateral negotiations among member countries while incorporating agreements on services and intellectual property.

2. (B) 1, 2, and 4
The Sanitary and Phytosanitary Measures agreement covers regulations safeguarding human, animal, and plant health from biological risks. Members can implement stricter national standards if they present scientific justification, and they are encouraged to align with international benchmarks. However, technical barriers like packaging design and standard food labeling are governed by the Technical Barriers to Trade agreement.

3. (A) To ensure health regulations do not create arbitrary trade barriers.
The primary goal of this framework is to protect human, animal, and plant health while preventing member nations from using sanitary and phytosanitary rules as disguised trade restrictions. It ensures that national safety measures are based on scientific principles and risk assessments, rather than being used as arbitrary or discriminatory tools to protect domestic industries.

4. (A) Both Statement I and Statement II are correct.
The multilateral trade system does not directly draft or publish detailed technical standards for food safety. Instead, the agreement explicitly designates recognized external organizations to perform this function. For food safety, the agreement formally recognizes the Codex Alimentarius Commission as the preeminent international body responsible for establishing standards, guidelines, and codes of practice to protect consumer health.

5. (C) A is true but R is false.
Under the established rules, countries are permitted to take provisional protective measures when relevant scientific evidence is insufficient to perform a complete assessment. However, they must actively seek additional information to conduct a more objective risk evaluation within a reasonable timeframe, meaning a strict prohibition on any temporary protective measures without a completed assessment does not exist.

6. (D) It covers measures specifying container dimensions and weights for fair trade.
Regulations concerning physical properties like container dimensions, weights, and typical commercial packaging parameters do not fall under sanitary and phytosanitary rules. These quality and marketing characteristics are instead regulated by the Technical Barriers to Trade framework. Sanitary and phytosanitary measures are strictly limited to protecting human, animal, or plant health from biological and chemical hazards.

7. (B) The developing country must provide a scientific risk assessment justifying the deviation from international standards.
When a member nation implements national food safety regulations that are more stringent than established international standards, it is required to provide scientific justification. This justification must be based on a systematic risk assessment process to demonstrate that the higher level of protection is necessary and does not function as an unjustified barrier to international trade.

8. (A) P-II, Q-III, R-I, S-IV
Different international bodies possess distinct mandates recognized under multilateral trade agreements. The Codex Alimentarius Commission establishes food safety standards, the World Organisation for Animal Health manages animal diseases, and the International Plant Protection Convention handles plant health. Meanwhile, the World Trade Organization manages the overall legal framework and provides the mechanism for settling related international trade disputes.

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148. All of the following constitute technical barriers to trade under the TBT agreement EXCEPT:
(A) Product packaging requirements designed to minimize environmental waste.
(B) Requirements for standardized nutritional labelling formats.
(C) Quarantine requirements to prevent the spread of a plant pathogen.
(D) Mandatory quality grading standards for fresh produce based on size and color.

149. Under the SPS Agreement, a member state can base its sanitary or phytosanitary measures on international standards. Which organization is responsible for setting these standards for plant health?
(A) IPPC
(B) OIE
(C) Codex Alimentarius Commission
(D) UNEP

150. What is a primary objective of the ILAC Mutual Recognition Arrangement (MRA)?
(A) To standardize and harmonize corporate tax rates for analytical laboratories globally.
(B) To mandate that all testing facilities purchase identical brands of laboratory equipment.
(C) To strictly enforce intellectual property and patent rights for chemical testing methods.
(D) To ensure test data from an accredited lab in one country is accepted by other signatories.

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(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

111. Which of the following statements about private food safety standards is incorrect?
(A) They are not developed by government bodies.
(B) They often require stricter compliance than national regulations.
(C) They are heavily driven by the requirements of large retail chains and supermarkets.
(D) They are enforceable by the WTO Dispute Settlement Body.

112. A developing country exports seafood. A major private buyer demands BRCGS certification, which requires significant upgrades to the processing facility. If the exporter fails to comply, they lose the contract, despite meeting all national legal requirements. What economic dynamic does this represent?
(A) A formal violation of the Most-Favoured-Nation rule by the importing government.
(B) An illegal imposition of import tariffs and custom barrier duties under the GATT.
(C) Private standards driving quality improvement but serving as market access barriers.
(D) A direct application of the precautionary principle by the WTO trade committee.

113. Match the terminology (List I) with its context in laboratory quality assurance (List II).
List I: Terminology
P. Calibration
Q. Traceability
R. Uncertainty of Measurement
S. Proficiency Testing
List II: Context in Laboratory Quality Assurance
I. Property of a measurement result relating it to a standard reference
II. Parameter characterizing the dispersion of values attributed to a measurand
III. Operation establishing the relationship between a measuring instrument and reference standards
IV. External quality assessment through inter-laboratory comparison
(A) P-III, Q-I, R-II, S-IV
(B) P-I, Q-III, R-IV, S-II
(C) P-III, Q-II, R-I, S-IV
(D) P-II, Q-IV, R-III, S-I

114. What is the most appropriate description of "Impartiality" as required by ISO/IEC 17065?
(A) The certification body must provide free testing and auditing services to all corporate applicants equally.
(B) The certification body must randomly select which standard rules to apply to ensure regulatory fairness.
(C) The certification body must be entirely owned and managed by the central governmental administration.
(D) The certification body must prevent commercial or financial pressures from compromising its decisions.

115. All of the following are potential reasons for the rejection of Indian food exports in the EU EXCEPT:
(A) Conformity with international Codex standards
(B) Presence of banned, unauthorized food colors
(C) High aflatoxin contamination in nuts or spices
(D) Detection of Salmonella in exported sesame seeds

116. Consider an exporter who wants to demonstrate that their food product meets Islamic dietary laws. The certification body they approach must be accredited to assure competence. Which standard specifies the requirements for this conformity assessment body?
(A) ISO 9001
(B) ISO/IEC 17025
(C) ISO/IEC 17065
(D) ISO 14001

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117. Which of the following is a correct pair regarding the roles in the accreditation ecosystem?
(A) IAF - Benchmarks management system certifiers globally
(B) NABL - Conducts actual chemical tests on food samples
(C) Food Testing Laboratory - Assesses and accredits NABL
(D) Exporter - Grants standard ISO/IEC 17025 certificates

118. A food testing laboratory replaces a critical piece of analytical equipment, such as an HPLC

9. (D) Importing countries must accept alternative measures if they achieve the importing country's level of protection.
The equivalence concept requires importing nations to accept the food safety and sanitary measures of exporting nations, even if they differ from their own, provided the exporting nation objectively demonstrates that its specific procedures achieve the importing nation's appropriate level of health protection. This facilitates trade without compromising essential safety and sanitary outcomes.

10. (A) International Organization for Standardization (ISO)
The Sanitary and Phytosanitary agreement officially recognizes three key standard-setting bodies, known as the Three Sisters, which are the Codex Alimentarius Commission, the World Organisation for Animal Health, and the International Plant Protection Convention. While the International Organization for Standardization develops wide-ranging voluntary technical standards, it is not explicitly designated as a core standard-setting body under this framework.

11. (B) 2, 4, 3, 1
The scientific process of evaluating risks associated with biological or chemical agents follows a strict sequence. It begins with identifying the hazard, followed by characterizing the hazard's inherent properties and potential adverse effects. Next, the level of human exposure is evaluated, and finally, all data are integrated to characterize the overall risk for the target population.

12. (B) TRIPS Agreement - Protection of intellectual property rights
Intellectual property rights, including patents, trademarks, copyrights, and geographical indications, are governed by the Agreement on Trade-Related Aspects of Intellectual Property Rights. Other agreements handle different issues; sanitary measures focus on health risks, technical barriers manage product characteristics and packaging, and agricultural agreements address trade subsidies, market access, and domestic support policies for farming.

13. (A) Requirement for scientific risk assessment
Member countries must base their sanitary and phytosanitary measures on a scientific risk assessment. If an importing nation rejects agricultural shipments, such as treated mangoes, without presenting valid scientific evidence of a hazard or demonstrating that existing treatment is insufficient, the exporting nation has the legal right to challenge the rejection under these specific scientific obligations.

14. (C) WHO - Fixing tariff rates on pharmaceutical products
The World Health Organization is a specialized public health agency of the United Nations and does not establish commercial tariff rates on any traded commodities, including pharmaceutical products. Tariffs and duties are negotiated and bound under the World Trade Organization legal framework, while the Three Sisters under sanitary rules specifically address food safety, animal health, and plant health.

15. (D) The obligation of members to notify safety measure changes and establish enquiry points.
Transparency within this framework requires member nations to promptly publish all sanitary and phytosanitary regulations and notify trading partners of any proposed changes that could affect international trade. Countries must also establish national enquiry points to respond to questions and provide relevant documentation, ensuring that trade partners can adjust to new requirements.

16. (C) Article 10
This specific article of the sanitary agreement addresses the unique economic and technical challenges faced by developing countries. It mandates that members take into account the special needs of developing nations when formulating measures. It also allows for longer compliance timeframes and technical assistance, ensuring these nations can participate effectively in global agricultural food trade.

17. (A) 1 and 3
Members must ensure that their sanitary and phytosanitary measures are based on a scientific assessment of risks to health. In doing so, they are permitted to establish their own appropriate level of protection, which can differ from international standards. Furthermore, economic factors such as production losses and control costs must be considered during the assessment.

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18. (D) The exporter must demonstrate its measures achieve the importing country's appropriate level of protection.
To apply this principle successfully, the exporting nation bears the responsibility of objectively demonstrating to the importing nation that its alternative sanitary measures provide the same level of safety. The importing nation is not required to automatically accept foreign rules, nor do the countries need identical laws; they must only achieve equivalent health outcomes.

19. (C) Statement I is correct but Statement II is incorrect.
Under the special and differential treatment provisions, developing nations are routinely granted longer time limits to comply with newly introduced sanitary measures. However, these provisions do not exempt developing countries from the fundamental obligation to provide scientific justification and conduct proper risk assessments if they choose to implement their own restrictive sanitary standards.

20. (C) A is true but R is false.
The agreement actively encourages nations to harmonize their national food safety rules with recognized international standards to facilitate trade. However, harmonization does not eliminate the legal right or necessity of importing nations to perform customs inspections, sample testing, and document verification at their borders to ensure compliance with those standards.

21. (A) It sets maximum residue limits for food additives in processed meats.
The World Organisation for Animal Health focuses entirely on monitoring global animal diseases, improving animal welfare, and preventing zoonotic infections. It does not possess a mandate to set maximum residue limits for food additives in processed meats. That specific scientific and regulatory task is managed by the Codex Alimentarius Commission under its food safety mandate.

22. (D) The measure is valid if scientifically justified to protect animal health, regardless of domestic economic benefits.
Sanitary measures taken to prevent the entry of animal diseases like Avian Influenza are considered legally valid if they are supported by scientific risk assessments. The incidental economic protection or price benefits experienced by the domestic poultry industry do not invalidate the measure, provided the primary objective remains the protection of animal health based on science.

23. (A) P-II, Q-IV, R-I, S-III
Different principles govern international sanitary and technical trade agreements. Harmonization involves basing domestic regulations on international standards, while equivalence entails accepting alternative safety measures that achieve the same level of protection. Transparency requires establishing enquiry points and notifying partners of regulatory modifications, whereas risk assessment evaluates the biological likelihood of pest entry and establishment.

24. (C) A document which lays down product characteristics or their related processes and production methods, with which compliance is mandatory.
Under the technical barriers framework, a technical regulation is defined as a formal document that specifies mandatory product characteristics, administrative provisions, or production processes. Because compliance is compulsory, any imported goods that fail to satisfy these specific regulatory requirements are legally prohibited from being placed on the market in the importing country.

25. (D) Quarantine regulations for imported livestock
Quarantine requirements for imported livestock are specifically designed to prevent the introduction and spread of animal diseases. Therefore, these measures are governed exclusively by the Sanitary and Phytosanitary agreement rather than the Technical Barriers to Trade framework. The latter manages non-sanitary issues like general product quality, packaging, and consumer information labels.

26. (A) The TBT Agreement
Mandatory requirements for organic labeling and certification are designed to prevent consumer deception, ensure fair marketing practices, and regulate product quality descriptions. Since these rules do not target risks from pathogens, pests, toxins, or food additives, they are evaluated under the Technical Barriers to Trade framework rather than the Sanitary and Phytosanitary agreement.

27. (B) Mandating font sizes for allergen warnings on labels - TBT Agreement
Labeling specifications, such as font size and formatting for allergen warnings, are classified as

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technical regulations governing how information is presented on products. Consequently, they fall under the scope of the Technical Barriers to Trade agreement. Conversely, establishing chemical residue limits or biological quarantine bans are sanitary and phytosanitary measures targeting health risks.

28. (B) It is a TBT issue because it concerns composition and quality, not risks from pests or toxins.
Requirements setting a minimum fat content for dairy products like cheese are compositional and quality standards, not measures to prevent health risks from toxins, pathogens, or pests. Because the regulation focuses on product description, commercial quality, and preventing consumer fraud, it is governed by the Technical Barriers to Trade agreement.

29. (A) TBT measure: Controlling microbial food contamination.
Regulating or testing for microbial contamination in food is aimed directly at protecting human health from foodborne diseases and pathogenic microorganisms. Therefore, this type of control is classified as a sanitary measure under the Sanitary and Phytosanitary agreement, making its categorization as a Technical Barriers to Trade measure incorrect.

30. (C) A document approved by a recognized body providing voluntary rules or guidelines for products.
Under the technical barriers agreement, a standard is defined as a document approved by a recognized organization that provides voluntary rules, guidelines, or characteristics for products or related processes. The key distinction from a technical regulation is that compliance with a standard is not legally mandatory for market access.

31. (D) Agreement on Technical Barriers to Trade (TBT)
This specific agreement seeks to ensure that technical regulations, voluntary standards, and conformity assessment procedures do not create unnecessary obstacles to international trade. It establishes rules requiring that these measures be non-discriminatory, transparent, and designed to fulfill legitimate objectives such as national security, environmental protection, or human health.

32. (A) 1, 2, and 4
Procedures like testing, sampling, and inspection are used to verify that products comply with technical regulations. These assessments must be conducted fairly and must not be more strict than necessary to provide confidence. However, charging fees for conformity assessment is not forbidden, provided the fees are equitable for domestic and foreign products.

33. (B) The SPS Agreement focuses exclusively on human, animal, and plant health, while the TBT Agreement covers all technical regulations, voluntary standards, and conformity assessment procedures.
The distinction between the two frameworks depends on the purpose of the measure. The sanitary agreement applies solely to measures protecting human, animal, or plant health from specific biological and chemical risks. The technical barriers agreement covers all other technical regulations, voluntary standards, and testing procedures across both agricultural and industrial products.

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34. (A) Both Statement I and Statement II are correct.
Both frameworks mandate that member nations establish national enquiry points to facilitate transparency and answer questions from trade partners. Furthermore, the scopes of these two agreements are mutually exclusive, meaning that a single measure cannot be categorized as both a sanitary measure and a technical barrier to trade simultaneously.

35. (D) A is false but R is true.
Requiring biodegradable packaging materials is an environmental and technical measure, which means it is classified as a technical barrier to trade rather than a sanitary measure. However, the sanitary agreement is correctly defined as regulating measures that protect human health from specific risks like additives, contaminants, or pathogens in food.

36. (C) All NTBs are strictly illegal under WTO rules, regardless of health or safety justifications.
Non-tariff barriers are not universally illegal under global trade rules. Member nations are permitted to implement regulatory trade restrictions, including import bans and quarantine requirements, if they are scientifically justified to protect human, animal, or plant health, or to

Measurement uncertainty quantifies the dispersion of values, and proficiency testing evaluates overall analytical performance by comparing results across multiple participating laboratories.

114. (D) The certification body must prevent commercial or financial pressures from compromising its decisions.
Impartiality is a fundamental requirement ensuring that certification activities are conducted objectively and without bias. To satisfy this requirement, the certification body must establish a management structure that identifies, analyzes, and mitigates any potential conflicts of interest, preventing commercial, financial, or other external pressures from compromising the integrity of its decisions.

115. (A) Conformity with international Codex standards
Indian food shipments face border rejections in the European Union due to issues like unauthorized colors, high aflatoxin levels, or Salmonella contamination. However, full compliance with international Codex standards is a positive safety benchmark that facilitates trade, and it does not serve as a reason or justification for rejecting agricultural exports.

116. (C) ISO/IEC 17065
A body that evaluates and certifies that food products comply with specific product standards, such as halal dietary laws, must demonstrate competence under this international standard. This standard specifies requirements for the operation of bodies certifying products, processes, and services, ensuring their evaluations are conducted impartially, competently, and consistently.

117. (A) IAF - Benchmarks management system certifiers globally
The International Accreditation Forum is the global association responsible for managing peer evaluation and recognition programs for accreditation bodies that certify management systems, products, and personnel. Conversely, national bodies like NABL accredit laboratories, while individual food laboratories perform actual chemical testing rather than granting accreditation to national boards.

118. (D) Calibrate the equipment to establish metrological traceability.
When a laboratory installs critical analytical equipment, it must perform calibration to establish an unbroken chain of traceability to national or international measurement standards. Under laboratory competence standards, this step is mandatory before the equipment can be used to perform accredited testing, ensuring the validity and accuracy of analytical results.

119. (B) TBT Agreement - Establishment of global Maximum Residue Limits (MRLs)
Maximum Residue Limits for agricultural pesticides, veterinary drugs, and chemical contaminants in food are established to protect human health from toxicological risks. Therefore, these limits are governed by the Sanitary and Phytosanitary agreement rather than the Technical Barriers to Trade agreement, making this specific association incorrect under WTO rules.

120. (C) Compliance with a standard is voluntary.
The fundamental legal difference between a standard and a technical regulation under the technical barriers framework lies in the mandatory nature of the measure. Compliance with a technical regulation is legally compulsory for market access, whereas a standard is defined as a document approved by a recognized body providing voluntary guidelines.

121. (A) 2, 1, 4, 3
A laboratory quality management system organizes its documentation in a structured hierarchy. The highest level consists of the Quality Manual and overarching policies. This is followed by Standard Operating Procedures describing specific processes, detailed work instructions for technical tasks, and finally, operational records and forms that document actual test results.

122. (A) Nations must grant equal trade advantages to all WTO members without discrimination.
This core principle of the multilateral trading system requires that any trade advantage, favor, privilege, or immunity granted by a member nation to any product originating in or destined for any other country must be accorded immediately and unconditionally to the like product originating in or destined for all other members.

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authorities, the shipments are flagged and refused entry to protect consumer safety.

47. (C) 1, 2, and 3
The warning system uses distinct categories to communicate risk levels. Alert notifications require immediate action for products on the market, border rejections flag shipments blocked at external boundaries, and information notifications convey identified risks that do not require rapid action. Importantly, the system applies to both external imports and intra-community trade.

48. (C) It damages export reputation and leads to increased testing of subsequent shipments.
Rejections at the border have negative economic consequences for an exporting nation. Beyond immediate financial losses, a high frequency of alerts damages the country's reputation for food safety. Consequently, importing authorities often impose stricter inspection regimes, physical examinations, and mandatory pre-shipment testing on subsequent shipments of those goods.

49. (A) Both Statement I and Statement II are correct.
These two international organizations manage global networks of accreditation bodies to ensure trust in conformity assessments. The International Accreditation Forum operates primarily in fields like management systems, products, and personnel certification. Meanwhile, the International Laboratory Accreditation Cooperation focuses specifically on the technical competence of testing laboratories, calibration facilities, and inspection bodies.

50. (C) A is true but R is false.
Mutual Recognition Arrangements facilitate global trade by enabling the cross-border acceptance of laboratory test reports and conformity certificates, preventing the need for duplicate testing. However, these arrangements are based entirely on technical competence and peer evaluations of accreditation bodies, requiring absolutely no harmonization of domestic political systems.

51. (A) They are signed only by developing states to bypass WTO trade rules.
International recognition arrangements are signed by accreditation bodies globally, spanning both developed and developing countries, and they fully align with multilateral trade agreements. These voluntary arrangements do not bypass trade rules; instead, they help reduce technical barriers to trade by establishing reciprocal trust in laboratory competence through rigorous peer evaluation programs.

52. (C) The importer is more likely to accept the results, reducing testing costs and delays.
When a national accreditation body is a signatory to this global arrangement, the test reports issued by its accredited facilities are recognized internationally. This recognition encourages importing countries to accept local safety certificates, significantly reducing the frequency of redundant testing at the border, lowering transaction costs, and minimizing customs clearance delays.

53. (A) P-III, Q-I, R-IV, S-II
Global and national bodies have specific roles in standard-setting and accreditation. The International Laboratory Accreditation Cooperation focuses on laboratories and inspection, while the International Accreditation Forum handles management systems and product certifications. Domestically, the National Accreditation Board for Testing and Calibration Laboratories is India's laboratory accreditor, while the International Organization for Standardization sets voluntary global standards.

54. (D) General requirements for the competence of testing and calibration laboratories.
This international standard outlines the general requirements for competence, impartiality, and consistent operation in testing and calibration laboratories. It is used globally to evaluate and accredit facilities performing testing, sampling, or calibration, ensuring that their analytical methods are validated, equipment is calibrated, and results are scientifically reliable and universally accepted.

55. (B) Requirement to manufacture and sell analytical instruments
Laboratories must satisfy rigorous requirements concerning impartiality, confidentiality, organizational structure, personnel competence, and testing resources to obtain accreditation. However, they are not involved in manufacturing or selling analytical instrumentation. Such commercial activities are entirely outside the scope of laboratory competence standards, which focus strictly on testing, calibration, and analysis.

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75. (B) Relating a result to a reference standard via an unbroken chain of calibrations.
This concept is defined as the property of a measurement result whereby it can be related to a stated reference, usually a national or international standard, through an unbroken and documented chain of calibrations. Each calibration in the chain must contribute to the overall evaluation of measurement uncertainty, ensuring accuracy.

76. (B) Basing national measures on international standards, guidelines, or recommendations.
Within global trade frameworks, harmonization refers to the effort of member nations to align their national regulations, technical specifications, and health measures with recognized international standards. This process facilitates trade by reducing regulatory differences and ensuring that food safety, quality, and animal health rules are consistent and predictable across borders.

77. (B) 2, 3, and 4
The technical barriers agreement applies to both industrial and agricultural products. It encourages nations to adopt international standards and permits regulations to protect legitimate objectives like safety and the environment. It strictly mandates that these regulations must not be more trade-restrictive than necessary to fulfill their intended safety purposes.

78. (C) It was established jointly by the FAO and the WHO.
This specialized commission was created under the joint auspices of the Food and Agriculture Organization and the World Health Organization. It develops voluntary standards, guidelines, and codes of practice to protect consumer health and ensure fair practices in food trade. While highly influential, its standards are not directly binding national laws.

79. (C) Statement I is correct but Statement II is incorrect.
Under technical trade agreements, countries must notify partners of proposed regulations that may affect trade when international standards do not exist. Similarly, the sanitary agreement strictly mandates that member nations notify trading partners of any new or modified food safety standards that could restrict trade, making the assertion that notifications are not required incorrect.

80. (A) Both A and R are true and R is the correct explanation of A.
The sanitary agreement allows member nations to adopt national health and safety standards that are more stringent than established international benchmarks. However, to ensure this right does not create arbitrary trade barriers, members must provide scientific justification, demonstrating that the higher standard is based on a proper risk assessment process.

81. (B) It must be uniform across all member countries of the WTO.
The appropriate level of protection is a sovereign decision made by each individual member nation to determine the level of risk it deems acceptable within its territory. There is no requirement for this level to be uniform across all member countries, provided the chosen standard is consistent and based on science.

82. (D) Equivalence
Under this specific principle, an importing nation is obligated to accept an alternative processing method proposed by an exporting nation if the exporter can scientifically prove that its method achieves the same level of health protection as the importer's mandated process, thereby facilitating trade without compromising necessary food safety outcomes.

83. (A) P-III, Q-IV, R-I, S-II
Sanitary and phytosanitary measures target specific safety goals in food and agricultural trade. Setting pesticide residue limits protects humans from chemical risks, while phytosanitary certificates for timber safeguard plant life from foreign pests. Regional animal health bans prevent disease transmission, and microbial inspections for pathogens protect consumers from acute foodborne diseases.

84. (C) Allowing trade from pest-free areas of a country, even if other parts are affected.
Regionalization is a principle that recognizes that pest or disease distribution is determined by geographic and ecological factors rather than political borders. It requires importing nations to permit agricultural imports from certified pest-free or low-pest areas within an exporting nation, even if other regions of that country remain affected by a disease outbreak.

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industry requirements rather than governmental regulations, and they are not legally mandated or enforced by the multilateral trade agreements of the World Trade Organization.

66. (D) It applies exclusively to the processing of heavily manufactured foods like soft drinks and candies.
This standard is specifically designed to focus on primary production and agricultural practices at the farm level, including crops, fruits, vegetables, livestock, and aquaculture. It does not apply to the heavy processing of industrial manufactured food products, making its restriction to processed soft drinks and candies incorrect under its actual scope.

67. (A) It creates a de facto market access barrier, though it is not a formal government regulation.
When major commercial retailers mandate compliance with private safety standards as a condition of purchase, it creates a practical market access barrier for suppliers who cannot afford certification. Since these requirements are private sector commercial choices rather than official government regulations, they operate outside the direct jurisdiction of multilateral trade treaties.

68. (A) P-II, Q-III, R-I, S-IV
Different private standards target specific stages and sectors of the food supply chain. GlobalGAP ensures good agricultural practices at the farm level, while the British Retail Consortium standard focuses on food manufacturing auditing. Safe Quality Food provides comprehensive farm-to-fork certification, and International Featured Standards are used by European retailers to audit processors.

69. (A) A global industry coalition that benchmarks and recognizes food safety certification programs.
This initiative is a global, industry-driven collaboration that works to benchmark and harmonize various private food safety standards. It does not issue certifications itself; instead, it establishes equivalence requirements and recognizes schemes that meet its criteria, facilitating trade by promoting the concept of once certified, accepted everywhere.

70. (D) Lack of access to any NABL accredited laboratories within the Indian subcontinent.
Indian exporters face significant hurdles, including high certification costs, stringent residue limits, and complex documentation for traceability. However, they do not suffer from a lack of accredited testing laboratories. India possesses a well-established and extensive network of testing laboratories accredited by its national accreditation body to perform chemical and microbiological analyses.

71. (C) 1, 2, 4, 3
The global quality infrastructure is structured hierarchically. At the operational level, accredited testing laboratories perform analyses. These facilities are accredited by national accreditation bodies, which operate in compliance with standards developed by standard-setting organizations. Finally, global cooperation bodies like the International Laboratory Accreditation Cooperation oversee national accreditors, establishing mutual recognition.

72. (C) BRCGS Food Safety - Auditing of food processing facilities
This private standard is specifically designed to audit food manufacturing and processing facilities to ensure safety, hygiene, and quality systems are implemented. In contrast, other frameworks apply elsewhere: ISO/IEC 17025 evaluates laboratory testing competence, ISO 9001 certifies general organizational quality management systems, and GlobalGAP focuses on agricultural practices.

73. (D) Reject the shipment at the border and issue a rapid alert to EU members.
When imported food is found to exceed the permitted chemical residues or contain unauthorized substances, European authorities reject the consignment at the border. This action triggers an immediate notification under the rapid alert network, informing other member countries about the risk and preventing the contaminated product from entering the single market.

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74. (A) SPS Agreement - Dimensions of shipping containers
Physical dimensions and weights of shipping containers are standard packaging and transport parameters that do not target health risks from biological pests, diseases, or chemical toxins. Consequently, these technical specifications fall under the scope of the Technical Barriers to Trade agreement, making their association with sanitary and phytosanitary measures incorrect.

fulfill other legitimate national policy objectives recognized by agreements.

37. (A) It acts as a Non-Tariff Barrier by discriminating against imports.
Charging significantly higher testing and conformity assessment fees for imported goods compared to subsidized domestic products violates the fundamental principle of national treatment. This discriminatory pricing practice creates an unfair financial disadvantage for foreign suppliers, functioning as a non-tariff barrier that restricts access to the domestic market.

38. (A) P-II, Q-IV, R-III, S-I
Commercial trade measures are classified into distinct regulatory types. Import duties represent traditional tariff barriers, while regional bans preventing animal disease spread are sanitary measures. Labeling requirements for real ingredients are technical barriers to trade. Finally, numerical volume limits restricting the quantity of a commodity allowed into a country function as non-tariff import quotas.

39. (B) Seeking a formal ruling through the WTO Dispute Settlement Body.
When a member nation believes that a trading partner has implemented sanitary regulations that violate international trade rules, the established mechanism is to initiate a dispute. This process is managed by the Dispute Settlement Body, which establishes panels to evaluate the scientific and legal arguments and issue binding rulings.

40. (C) Disagreements over font colors for promotional soft drink marketing.
Disputes at the multilateral level typically involve substantial trade-restrictive measures, such as bans lacking scientific justification, discriminatory taxes, or procedural delays. Purely aesthetic marketing characteristics, like font colors used in commercial soft drink promotions, do not represent technical regulations or sanitary barriers that significantly restrict trade or trigger international disputes.

41. (A) 2, 1, 3, 4
The formal dispute resolution process follows a structured sequence. It begins with mandatory bilateral consultations between the parties. If consultations fail, the complainant requests the establishment of a dispute panel to hear the case. Following the panel's report, parties can appeal to the Appellate Body, leading finally to implementation or authorized retaliation.

42. (A) US-Clove Cigarettes case - Dispute over the ban on flavoured tobacco products under TBT
This notable dispute centered on a national ban on flavored cigarettes, which was challenged as a discriminatory technical barrier under the Technical Barriers to Trade agreement. Other famous cases involved different issues, such as the hormones dispute which focused on agricultural hormone treatments and food safety under the sanitary framework.

43. (B) The ban will be struck down because it is not based on scientific principles and a proper risk assessment.
Under the sanitary agreement, any trade restriction or import ban on agricultural products must be based on scientific principles and a systematic risk assessment. If a country imposes a ban on genetically modified corn without scientific evidence showing a risk to health, the measure will be ruled inconsistent with trade obligations.

44. (B) MRA - Mandatory Risk Assessment
In international trade and laboratory accreditation, this acronym stands for Mutual Recognition Arrangement, not mandatory risk assessment. These arrangements enable different nations to accept test reports and calibration certificates issued by accredited laboratories in other signatory countries, thereby eliminating the need for redundant testing and reducing technical trade barriers.

45. (A) It allows member states to rapidly share information when a food safety risk is detected.
This system functions as a rapid notification network designed to protect public health within the European market. When a member state identifies a food or feed product that poses a serious risk to human or animal health, it uses this platform to immediately notify other members, enabling swift control and recall actions.

46. (C) Pesticide residues exceeding EU Maximum Residue Levels in spices and rice.
Indian agricultural exports, particularly spices, rice, and fresh produce, regularly face border rejections and warnings in the European Union due to chemical residues. When local agricultural chemicals exceed the highly stringent Maximum Residue Limits established by European

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85. (A) Protecting domestic industries from foreign competition
The technical barriers agreement allows member nations to implement technical regulations to achieve legitimate public policy objectives. These objectives include protecting national security, preventing deceptive commercial practices, and safeguarding human, animal, or plant health. However, implementing regulations specifically to shield domestic industries from foreign competition is protective and prohibited under international trade rules.

86. (D) Special and Differential Treatment
This trade concept addresses the developmental and financial constraints of poorer nations by offering flexible terms. Under these provisions, developing countries are granted longer compliance windows, phased implementation schedules, and technical assistance. This support enables them to upgrade their laboratory infrastructure and align with newly introduced international sanitary and food safety standards.

87. (B) IPPC - Hosted by the FAO in Rome, Italy
The secretariat of the International Plant Protection Convention is formally hosted by the Food and Agriculture Organization at its headquarters in Rome. Conversely, other international bodies are located elsewhere: the World Trade Organization is in Geneva, the World Organisation for Animal Health is in Paris, and Codex is also based in Rome.

88. (C) A TBT measure, because it involves labelling and quality standards unrelated to safety.
Regulatory detentions resulting from packaging, trademark logos, or organic design specifications are classified as technical barriers. These requirements do not target sanitary hazards such as microbial contamination, toxic residues, or biological pests. Because they govern product presentation and quality descriptions, they fall under the jurisdiction of the Technical Barriers to Trade agreement.

89. (D) Unpredictable customs valuation - Facilitates smooth and rapid trade
Non-tariff barriers generally hinder and delay international commerce. Unpredictable or non-transparent customs valuation procedures create severe financial uncertainty, increase administrative costs, and cause lengthy delays for foreign suppliers. Therefore, characterizing unpredictable valuation as a mechanism that facilitates smooth and rapid trade is incorrect under international trade economics.

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90. (A) A procedure used to determine if technical regulations or standards are fulfilled.
Under multilateral trade agreements, a conformity assessment procedure is any process used directly or indirectly to verify that relevant requirements in technical regulations or voluntary standards are fulfilled. These procedures commonly include sampling, testing, laboratory analysis, calibration, inspection, and formal certification to ensure compliance before products enter the market.

91. (D) Article XX(b)
This critical article of the General Agreement on Tariffs and Trade provides the legal exceptions that permit member countries to adopt measures necessary to protect human, animal, or plant life or health. This provision serves as the historical and legal foundation upon which the modern Sanitary and Phytosanitary agreement was established.

92. (A) 1, 2, and 4
This principle allows member nations to adopt provisional health measures when scientific evidence is insufficient to perform a full risk assessment. However, members cannot maintain these temporary restrictions indefinitely; they are required to seek additional information and conduct a more objective risk evaluation within a reasonable, scientifically justified timeframe.

93. (A) It sets standards for food hygiene, additives, and residues of pesticides or drugs.
This international standard-setting body is responsible for establishing comprehensive guidelines, standards, and codes of practice covering food additives, veterinary drug residues, pesticide limits, and general food hygiene. While its standards are voluntary, they are recognized as the global reference benchmarks for resolving sanitary trade disputes.

94. (A) Both Statement I and Statement II are correct.
The International Plant Protection Convention is a multilateral treaty designed to prevent the introduction and spread of plant pests. It establishes international standards for phytosanitary measures and provides the global administrative framework for issuing phytosanitary certificates, which are required in

international trade to verify that plant shipments are pest-free and healthy.

95. (A) Both A and R are true and R is the correct explanation of A.
Under international standards, certification bodies must operate with absolute impartiality and maintain strict confidentiality regarding client data. The standard ISO/IEC 17065 mandates these requirements to eliminate conflicts of interest, prevent commercial pressures from influencing certification decisions, and establish global trust and objectivity in product certifications.

96. (C) They mandate that signatory nations merge their political boundaries.
Mutual Recognition Arrangements are technical agreements designed to facilitate trade by ensuring that test reports from accredited laboratories are accepted across national borders. These arrangements are based entirely on technical evaluations of laboratory competence and do not require or influence any merging of political boundaries or sovereignty of the participating nations.

97. (B) NABL's signatory status to the ILAC Mutual Recognition Arrangement.
The acceptance of local test reports by European importers without re-testing is a direct benefit of international accreditation agreements. Because India's national accreditation body is a signatory to this global arrangement, its accredited laboratories are recognized as technically competent, allowing their test results to be accepted in other signatory countries.

98. (A) P-III, Q-II, R-IV, S-I
Different standards establish requirements for distinct aspects of quality and safety. ISO 9001 defines general quality management systems, while ISO/IEC 17025 specifies laboratory testing and calibration competence. ISO/IEC 17065 regulates bodies certifying products, processes, and services, whereas ISO 22000 outlines the framework for food safety management systems across the supply chain.

99. (A) To satisfy global retailers who demand GFSI-recognized certifications.
Food processing companies seek this private certification primarily because major global retailers and supermarkets demand compliance with standards benchmarked by the Global Food Safety Initiative. Achieving this certification demonstrates a robust food safety management system, helping manufacturers secure retail contracts, access international markets, and build strong consumer trust.

100. (C) Guaranteeing zero errors in all future routine testing.
Participating in proficiency testing helps laboratories identify systematic errors, verify the accuracy of their analytical methods, and demonstrate technical competence to accreditation bodies. However, while it is an essential quality control tool, it cannot provide an absolute guarantee of zero analytical errors in all future routine laboratory testing.

101. (B) 1, 3, 4, 2
The standard procedure to achieve laboratory accreditation begins with implementing the quality management system and generating operational records. The facility then submits a formal application to the national accreditation body. Next, assessors conduct an on-site audit, requiring the laboratory to close any identified non-conformities before the final accreditation is granted.

102. (D) Alert Notification - Serious risk on the market requiring rapid action
Under the rapid alert framework, an alert notification is specifically sent when a food or feed product presenting a serious health risk is already circulating on the market. This notification requires member countries to take immediate risk management actions, such as withdrawing the product or issuing a public recall, to safeguard consumers.

103. (B) The EU is applying an SPS measure to protect health from chemical residues.
Rejections of agricultural commodities due to chemical, pesticide, or veterinary drug residues exceeding national limits are classified as sanitary measures. These regulations are designed to protect human health from toxicological risks associated with food contaminants. Therefore, the rejection of the rice shipment falls under the Sanitary and Phytosanitary agreement rather than technical or quality standards.

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104. (C) FSSAI - Food Standard and Safety Authority International
In India, this acronym stands for the Food Safety and Standards Authority of India, which is the national statutory regulator established under the Ministry of Health and Family Welfare. It is not an international authority, making the substitution of the word International for India incorrect under the established regulatory framework.

105. (D) An assessment by an independent accredited body verifying compliance.
This type of certification involves an audit conducted by an independent, competent, and accredited external organization. This body has no commercial connection to the manufacturer, supplier, or purchaser, ensuring that its assessment and subsequent certificate are objective, transparent, and trusted by global buyers, retailers, and regulatory authorities.

106. (A) Imported goods must be treated as favourably as domestic goods within the market.
This core trade principle mandates that once imported goods have cleared customs and entered a national market, they must receive treatment no less favorable than identical or competitive domestic goods. This prevents governments from using internal taxes, sanitary regulations, or technical standards to discriminate against foreign products in favor of domestic industries.

107. (A) 1, 2, and 3
The sanitary agreement focuses on measures protecting health, requiring scientific risk assessments, while the technical barriers agreement regulates voluntary and mandatory product specifications. Both agreements prohibit discriminatory practices. However, labeling requirements linked directly to health and food safety, such as allergen warnings, actually fall under the sanitary agreement, not the technical barriers framework.

108. (B) The OIE establishes international standards and guidelines for animal health and zoonoses.
This organization is formally recognized under multilateral trade agreements as the reference body for animal health standards. It develops international codes and manuals to prevent the spread of zoonotic diseases and protect animal health in global trade. Conversely, other international bodies like ISO do not set mandatory national laws, and Codex operates independently of WTO dictation.

109. (C) Statement I is correct but Statement II is incorrect.
If a country bases its national food safety standard on a Codex standard, that measure is legally presumed consistent with the sanitary agreement. However, choosing a stricter standard than Codex is not automatically illegal; nations are permitted to adopt more stringent rules if they provide scientific justification based on a proper risk assessment.

110. (A) Both A and R are true and R is the correct explanation of A.
The sanitary agreement regulates all measures designed to protect human health from risks arising from zoonotic diseases transmitted by animals. Since these infectious pathogens can cross international borders through the trade of live animals and raw animal products, applying science-based sanitary controls is essential to prevent global outbreaks while facilitating safe trade.

111. (D) They are enforceable by the WTO Dispute Settlement Body.
Private food safety standards are developed by commercial retailers, food service companies, or industry coalitions, rather than government agencies. Consequently, they operate as voluntary private commercial agreements and are not formal government treaties, which means they cannot be enforced by the World Trade Organization or its intergovernmental dispute settlement mechanism.

112. (C) Private standards driving quality improvement but serving as market access barriers.
While private standards encourage processors to improve food safety and quality management systems, they simultaneously act as de facto trade barriers for small exporters who lack the capital to invest in facility upgrades. Because these demands are commercial conditions set by private buyers rather than governments, they reflect market-driven access dynamics.

113. (A) P-III, Q-I, R-II, S-IV
Laboratory quality assurance relies on precise technical concepts. Calibration establishes the relationship between instruments and reference standards, while metrological traceability links measurement results to a defined reference.

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56. (C) By obtaining accreditation under ISO/IEC 17065.
To demonstrate competence in evaluating and certifying products, processes, or services, a conformity assessment body must achieve accreditation under this specific international standard. This standard establishes requirements for impartiality, confidentiality, and technical capability, ensuring that the certification decisions made by the accredited body are objective, reliable, and trusted globally.

57. (D) ISO 22000 - Food Safety Management Systems
This standard outlines requirements for organizations in the food chain to demonstrate their ability to control safety hazards, ensuring food is safe for consumption. Conversely, other standards serve different purposes: laboratory competence is covered by ISO/IEC 17025, environmental management is under ISO 14001, and product certification bodies must comply with ISO/IEC 17065.

58. (A) ISO/IEC 17025
A laboratory that operates with uncalibrated analytical instruments and fails to maintain documented training records for its personnel violates the technical competence and resource requirements of this specific standard. Achieving accreditation under this standard requires strict adherence to calibration schedules, personnel training protocols, and validated testing methods to ensure reliable analytical results.

59. (B) FSSAI - Foreign Standard-Setting and Accreditation Institution
In India, this acronym stands for the Food Safety and Standards Authority of India, which is the statutory national regulatory body responsible for setting science-based food standards and regulating manufacture, storage, distribution, sale, and import. It is not a foreign standard-setting or accreditation institution, making its definition in this context incorrect.

60. (B) Evaluation of performance against pre-set criteria via inter-laboratory comparisons.
Proficiency testing is a vital quality control mechanism where a laboratory's analytical performance is evaluated against pre-established criteria. This evaluation is achieved by distributing identical sub-samples of a material to multiple participating laboratories for analysis, allowing an independent assessment of each facility's accuracy, calibration consistency, and overall technical testing competence.

61. (A) National Accreditation Board for Testing and Calibration Laboratories (NABL)
This organization is the formal national accreditation body in India responsible for assessing and certifying the technical competence of testing and calibration laboratories. It operates under the Quality Council of India and grants accreditation under the international standard ISO/IEC 17025, ensuring Indian laboratories are globally recognized for chemical and biological testing.

62. (B) 1, 2, and 4
The accreditation process requires laboratories to demonstrate competence for specific testing parameters and participate in proficiency testing programs. Assessors conduct thorough on-site audits to verify compliance with international standards. However, this technical accreditation is designed for testing laboratories and is not a mandatory requirement for primary agricultural producers or farmers in India.

63. (D) It involves conducting and evaluating measurements on similar items by multiple laboratories.
Inter-laboratory comparison is a systematic process that involves the organization, performance, and evaluation of tests or measurements on the same or similar items by two or more laboratories. It is used as a critical quality tool to verify testing methods, identify potential equipment bias, and ensure consistency across different analytical facilities.

64. (C) Statement I is correct but Statement II is incorrect.
Third-party certification involves an independent, accredited body auditing a product or system to verify compliance with standards, providing high trust. Conversely, first-party certification is a self-assessment performed by the manufacturer or supplier. Assessments conducted by the purchaser or customer are defined as second-party audits, making the definition of first-party incorrect.

65. (C) A is true but R is false.
Private food safety standards are widely demanded by international retail chains to manage supply chain risks and protect corporate brand reputation. However, these private standards are voluntary

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123. (C) Article 5.7: Provisional measures
This specific article of the sanitary agreement permits member countries to adopt temporary sanitary or phytosanitary measures when relevant scientific evidence is insufficient. This provision allows countries to protect health from potential risks while actively seeking additional information to conduct a more objective risk assessment within a reasonable period.

124. (B) ISO - Enforcer of WTO Trade Disputes
The International Organization for Standardization is an independent, non-governmental organization that develops voluntary international standards. It possesses absolutely no mandate, legal authority, or institutional mechanism to enforce trade agreements or resolve trade disputes. That enforcement role is performed exclusively by the Dispute Settlement Body of the World Trade Organization.

125. (A) To answer inquiries and provide documents on adopted or proposed measures.
National enquiry points are established under trade agreements to facilitate transparency and communication. Their primary function is to respond to all reasonable questions from trading partners and provide copies of existing or proposed sanitary regulations, technical standards, and conformity assessment procedures, helping foreign suppliers understand and comply with local requirements.

126. (A) 1, 2, and 4
Indian exporters face significant challenges complying with strict private standards, managing supply chain traceability across highly fragmented smallholder agricultural lands, and navigating variable residue limits across importing nations. Conversely, importing countries do not lower their health and safety standards to accommodate exports, as these levels are set based on national protection policies.

127. (D) It specifies requirements for the competence and impartiality of product certification bodies.
This international standard establishes the criteria for bodies operating product, process, and service certification programs. It focuses on ensuring that these conformity assessment bodies operate in an impartial, consistent, and technically competent manner, thereby building global trust and acceptance of the certificates they issue to food producers and manufacturers.

128. (C) Statement I is correct but Statement II is incorrect.
The dispute body of the multilateral trade system has the legal authority to authorize retaliatory measures if a member fails to implement a ruling. However, when resolving technical and sanitary disputes, the panels do not rely on the International Organization for Standardization, but consult scientific experts from the recognized standard-setting bodies.

129. (A) Both A and R are true and R is the correct explanation of A.
The sanitary agreement mandates that member countries promptly publish and notify trading partners of any new or modified sanitary regulations. This commitment to transparency is required to ensure that food safety rules are not introduced secretly or used as disguised, non-tariff restrictions on international trade, allowing exporters time to comply.

130. (B) The certification body can offer consultancy services to the same client it is certifying to increase revenue.
To maintain absolute impartiality, a product certification body is strictly prohibited from offering consultancy services to the same clients it audits and certifies. Providing consultancy creates a severe conflict of interest, as the body would essentially be evaluating its own work, which violates the core independence requirements of this standard.

131. (A) Impartiality
When an auditor evaluating an agricultural operation holds a financial interest or shares in that specific farm, it creates a direct conflict of interest. This situation violates the fundamental requirement for objectivity and impartiality, as personal financial benefit could influence the certification decision, undermining the integrity of the conformity assessment process.

132. (A) P-III, Q-I, R-IV, S-II
Specific international standards and trade agreements regulate distinct technical requirements. Metrological traceability is a core laboratory requirement under ISO/IEC 17025, while scientific risk assessment is mandated by the sanitary agreement. Impartiality of product certification is governed by ISO/IEC 17065, and notification of technical regulations is managed under the technical barriers agreement.

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feasibility and risk assessment to advise the Authority.
(B) The industry associations negotiate and directly dictate the specifications of the final standard.
(C) The respective state-level enforcement officers vote on the scientific validity of the standard.
(D) The draft regulation is immediately and permanently abandoned by the central authority without review.

30. What is the primary cause-and-effect relationship of publishing a draft regulation in the official gazette before finalization?
(A) Cause: Direct need to generate additional administrative revenue; Effect: Registered companies pay consultation fees to view the draft standard.
(B) Cause: Administrative and bureaucratic delay within the ministry; Effect: Regulatory food safety standards are indefinitely postponed.
(C) Cause: Requirement for transparency; Effect: Stakeholders provide feedback, leading to practical standards.
(D) Cause: Strict WTO mandate to block agricultural imports; Effect: Immediate and complete cessation of all bilateral foreign trade activities.

31. Under FSSAI regulations, what category covers food products that have not been specifically standardized under any existing regulations?
(A) Organic Foods
(B) Fortified Foods
(C) Genetically Modified Foods
(D) Proprietary Foods

32. Directions: In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): The enforcement of the Food Safety and Standards Act is primarily the responsibility of State/UT Governments.
Reason (R): FSSAI functions solely as an advisory body without any central licensing or direct enforcement capabilities.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

33. Which of the following is NOT a recognized category of food product standards under FSSAI regulations?
(A) Dairy products and analogues
(B) Pharmaceutical drugs
(C) Sweets and confectionery
(D) Cereal and cereal products

34. Identify the correct statement regarding 'Vertical' and 'Horizontal' standards in FSSAI.
(A) Vertical standards apply broadly across all processed food categories, including overarching structural rules such as labelling requirements.
(B) Horizontal standards detail specific identity, quality, and compositional requirements for a single restricted product class, like pure honey.
(C) Vertical standards are formulated exclusively for imported foreign foods, while horizontal standards apply only to local domestic foods.
(D) Horizontal standards regulate overarching safety requirements like additives and contaminants across food categories.

35. Consider the following statements regarding the powers of a Designated Officer (DO):
I. Issuing or cancelling licenses of food business operators.
II. Prohibiting the sale of any article of food which is in contravention of the Act.
III. Sanctioning or launching prosecutions in cases of contraventions.
IV. Appointing the Chief Executive Officer of FSSAI.
Which of the above statement(s) is/are correct?
(A) I, II, and III
(B) I, II, and IV
(C) II, III, and IV
(D) I, III, and IV

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36. Identify the incorrect pair regarding the state enforcement structure.
(A) Commissioner of Food Safety – Appointed by the State Government
(B) Designated Officer – Must be a whole-time officer, not below the rank of Sub-Divisional Officer
(C) Food Safety Officer – Appointed directly by the Central Government
(D) Adjudicating Officer – Typically an officer

143. (A) Both A and R are true and R is the correct explanation of A.
Exporters in developing nations frequently face challenges in meeting the stringent requirements of private food standards. Complying with standards like GlobalGAP requires significant capital investment to upgrade facilities, establish extensive traceability documentation, and maintain technical expertise, which presents a major financial and operational burden for small-scale agricultural producers.

144. (C) The AoA overrides the SPS Agreement, meaning safety measures cannot restrict agricultural market access under any circumstance.
The Agreement on Agriculture does not override sanitary rules. While the agricultural agreement regulates subsidies, domestic support, and market access, countries maintain the sovereign right to restrict imports using sanitary measures if they are scientifically justified. These agreements are designed to be complementary, ensuring safety measures are not used as disguised protectionism.

145. (B) It provides a quantitative indication of the quality and reliability of the test result.
Evaluating measurement uncertainty is a critical technical requirement under laboratory competence standards. It provides a quantitative estimate of the dispersion of values that could reasonably be attributed to the test result, offering a clear measure of the precision, reliability, and technical quality of the chemical or biological analysis performed.

146. (A) P-II, Q-IV, R-III, S-I
International trade barriers are categorized into distinct regulatory frameworks. Import duties represent traditional tariff barriers, while non-transparent certification processes function as procedural non-tariff barriers. Quarantine bans targeting animal diseases like Avian Influenza are sanitary measures, whereas mandatory volume specifications for product packaging are regulated as technical barriers to trade.

147. (A) Obtaining certification from an accredited ISO/IEC 17065 body.
To build robust international buyer confidence in organic claims, an exporter should obtain product certification from an independent body accredited under this standard. This third-party certification provides objective, credible, and globally recognized assurance that the food products have been evaluated and comply with established organic standards and production methods.

148. (C) Quarantine requirements to prevent the spread of a plant pathogen.
Quarantine regulations and border controls established to prevent the introduction or spread of biological plant pathogens are designed to protect plant health. Consequently, these measures are governed by the Sanitary and Phytosanitary agreement rather than the Technical Barriers to Trade agreement, which manages non-sanitary product standards and labeling formats.

149. (A) IPPC
Under the sanitary agreement, three organizations are designated to establish international standards. For plant health and protection against agricultural pests, the recognized standard-setting body is the International Plant Protection Convention. It drafts international phytosanitary standards to safeguard plant resources while facilitating safe, science-based agricultural trade among member nations.

150. (D) To ensure test data from an accredited lab in one country is accepted by other signatories.
The primary objective of this global agreement is to establish reciprocal trust among national accreditation bodies. By ensuring that signatory countries use equivalent accreditation processes, it facilitates the international acceptance of laboratory test reports and calibration certificates, realizing the trade goal of having products tested once and accepted globally.

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133. (A) An agreement recognizing that different measures achieve the same level of sanitary protection.
An equivalence agreement is a formal bilateral treaty where two nations agree that their different food safety and sanitary control systems, although not identical in procedures or laws, achieve the same level of protection. This recognition facilitates trade by removing redundant laboratory testing, physical inspections, and certification procedures at the border.

134. (D) Automatic acceptance of the exporter's lab results.
Lacking mutual recognition coverage creates technical challenges for exporting nations, including redundant testing at both origin and destination, increased customs delays, and higher transactional costs. However, it does not lead to the automatic acceptance of laboratory test reports, which is a benefit reserved exclusively for signatories of recognition arrangements.

135. (A) 3, 1, 2, 4
Resolving a sanitary or trade dispute follows a strict legal sequence. The process begins with a formal request for bilateral consultations. If unresolved, a dispute panel is established to hear arguments and issue a ruling. This ruling can be appealed to the Appellate Body, followed by implementation of the decision or authorized retaliation.

136. (C) Disease control - Banning live pigs from Swine Fever zones
Banning imports of live animals from geographic regions where infectious animal diseases like Swine Fever are endemic is a classic example of a sanitary measure. This type of quarantine control is designed specifically to prevent disease transmission, falling directly under the scope and protective objectives of the Sanitary and Phytosanitary agreement.

137. (D) Yes, provided the EU has scientific justification and a risk assessment supporting its standard.
Under the sanitary agreement, member nations are permitted to implement food safety standards and residue limits that are stricter than established international Codex benchmarks. However, to maintain these strict national requirements, the country must possess scientific justification and demonstrate that the standard is supported by a comprehensive risk assessment.

138. (A) IPPC - Promotes intellectual property rights for new plant varieties
The International Plant Protection Convention is a multilateral treaty focused on preventing the introduction and spread of plant pests and protecting cultivated and wild plants. It does not possess a mandate to manage, promote, or regulate intellectual property rights or patents for new plant varieties, making this specific association incorrect.

139. (B) Provisions giving developing countries longer compliance times and safeguarding their trade.
This principle incorporates specific provisions within trade agreements to address the unique constraints of developing nations. It grants these countries longer transitional periods to comply with new regulations, flexible implementation terms, and targeted technical assistance, helping safeguard their export trade and integrate them effectively into the global trading system.

140. (B) 1, 2, and 3
This rapid notification network connects European food safety regulators, the Commission, and the authority to share information regarding food safety risks. These notifications can trigger rapid market withdrawals and consumer recalls. Crucially, the system covers risks identified in both human food products and animal feed, making its restriction to food incorrect.

141. (A) It benchmarks existing safety standards against globally recognized criteria.
This global, industry-led coalition does not perform audits or issue food safety certificates itself. Instead, its primary function is to benchmark existing private food safety standards against a set of globally recognized requirements, promoting equivalence and ensuring that different certified schemes are accepted by retailers around the world.

142. (C) Statement I is correct but Statement II is incorrect.
Under laboratory competence standards, facilities must have documented procedures to manage nonconforming work and implement corrective actions. However, performing internal calibrations does not exempt a laboratory from participating in inter-laboratory comparisons; participation in proficiency testing is a mandatory requirement to independently demonstrate ongoing technical competence to accreditation bodies.

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7. What is the statutory definition of the "Central Advisory Committee" (CAC) under the FSSAI framework?
(A) A standing committee solely responsible for drafting food additive limits and pesticide residues.
(B) Advises on prioritization of work and identifies potential risks.
(C) A parliamentary committee established to review the financial audits and annual expenditures of FSSAI.
(D) A scientific panel dedicated exclusively to safety evaluations of novel foods and genetically modified organisms.

8. Match the FSSAI Authorities in List I with their respective functions in List II.
List I: FSSAI Authorities
P. Chairperson
Q. Chief Executive Officer (CEO)
R. Scientific Committee
S. Central Advisory Committee
List II: Functions
I. Legal representative and administrative head
II. Provides overarching scientific opinion and coordinates panels
III. Represents FSSAI at the highest level and presides over the authority
IV. Advises on prioritization of work and identifies potential risks
(A) P-I, Q-III, R-IV, S-II
(B) P-III, Q-IV, R-II, S-I
(C) P-III, Q-I, R-II, S-IV
(D) P-II, Q-I, R-III, S-IV

9. Which of the following represents the most appropriate description of the "risk analysis" framework as mandated for FSSAI?
(A) An economic and market assessment process to determine the business profitability of food sectors.
(B) A purely laboratory-based microbiological diagnostic protocol for determining total microbial load.
(C) An emergency response mechanism restricted exclusively to border control and import rejection scenarios.
(D) A framework comprising risk assessment, risk management, and risk communication.

10. A State Food Safety Commissioner notices conflicting enforcement interpretations of a new FSSAI standard across different districts. Under the FSSA 2006 framework, what is the most appropriate conceptual application for resolving this?
(A) The Commissioner should escalate the issue to the Central Advisory Committee for guidance.
(B) The Commissioner should unilaterally amend the standard for that state to suit local business needs.
(C) The Commissioner must direct all field Food Safety Officers to halt inspections and licensing indefinitely.
(D) The Commissioner should refer the administrative matter to the judicial bench of the National Green Tribunal.

11. Arrange the following administrative layers of FSSAI enforcement in descending order of authority:
1. Food Safety Officer
2. Commissioner of Food Safety
3. Designated Officer
4. Chief Executive Officer (FSSAI)
(A) 4, 2, 3, 1
(B) 2, 4, 3, 1
(C) 4, 3, 2, 1
(D) 2, 3, 4, 1

12. Identify the incorrect statement regarding the composition of the Food Authority (FSSAI).
(A) It consists of a Chairperson and twenty-two members.
(B) The CEO of FSSAI holds veto power over all scientific panel recommendations.
(C) One-third of the members of the Food Authority must be women.
(D) It includes representatives from the food industry, consumer organizations, and farmers' organizations.

13. Identify the correct pair regarding FSSAI's statutory interfaces.
(A) Scientific Panels – Independent scientific experts evaluating specific food hazards
(B) Food Authority – Comprises 35 members appointed by State Governments
(C) Designated Officer – Functions as the central import clearance authority at seaports
(D) Adjudicating Officer – Appointed exclusively to handle severe criminal prosecutions and appeals in High Courts

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44. A State Designated Officer (DO) conducts an enforcement drive and lifts food samples from a railway station cafeteria. The cafeteria manager claims immunity, stating railways fall under central jurisdiction. How does FSSA resolve this jurisdictional issue?
(A) State DOs are vested with absolute and unrestricted regulatory jurisdiction over all central government properties.
(B) Railways fall under the jurisdiction of Central FSSAI Designated Officers for railways.
(C) State enforcement officers can collect samples but are required to send them to foreign accredited laboratories.
(D) Commercial cafeterias operating within railway stations are completely exempt and do not require any FSSAI license.

45. The FSSA 2006 separates risk assessment from risk management. What is the expected effect of this structural separation?
(A) Cause: Independent panels separate from administration; Effect: Decisions are unbiased and based on science.
(B) Cause: Complete bureaucratic fusion of assessment and management functions; Effect: Significantly faster prosecution of minor violations.
(C) Cause: Total legislative delegation of standards to State Governments; Effect: Rapid development of harmonized national food regulations.
(D) Cause: Direct elimination of scientific panels from standard setting; Effect: Transition to a purely administrative form of rule-making.

46. As per standard FSSAI guidelines, a Food Safety Officer must generally inspect every licensed food business operator under their jurisdiction at least:
(A) Once a month to maintain maximum oversight
(B) Once every five years during license renewal
(C) Once in six months or per risk-based protocols
(D) Only upon receiving a formal written consumer complaint

47. Directions: In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): Surveillance samples lifted by a Food Safety Officer cannot be directly used to initiate a criminal prosecution against an FBO.
Reason (R): Surveillance sampling is meant for trend analysis and risk monitoring, lacking the strict statutory documentation required for enforcement sampling.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

48. Which of the following is NOT a statutory duty of a Food Safety Officer under Section 38 of the FSSA, 2006?
(A) Taking samples of food or food additives for analysis.
(B) Seizing articles of food suspected to be adulterated.
(C) Finalizing budgets for testing laboratories.
(D) Inspecting premises where food is manufactured or stored for sale.

49. Identify the correct statement regarding FSSAI's market monitoring and surveillance activities.
(A) Surveillance activities are conducted exclusively to impose financial penalties on street vendors.
(B) The National Milk Survey is a targeted surveillance program.
(C) Surveillance data is kept classified and never shared with the scientific panels.
(D) Market monitoring is restricted to imported food commodities only.

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50. Consider the following procedural steps when an FSO takes a sample for enforcement:
I. Paying the cost of the sample to the FBO.
II. Dividing the sample into four parts.
III. Sealing and fastening each part with signatures.
IV. Dispatching one part immediately to the Food Analyst.
Which of the above statement(s) is/are correct?
(A) I, II, and III
(B) II, III, and IV
(C) I, III, and IV
(D) I, II, III, and IV

51. Identify the incorrect pair regarding the forms used by an FSO during enforcement.
(A) Form I – Health certificate for food handlers
(B) Form V A – Official notice served to the

review and accedes final approval to draft standards

22. What defines a "Scientific Opinion" in the context of FSSAI's standard-setting process?
(A) A legally binding criminal charge filed in a district court against a non-compliant FBO.
(B) A national consumer survey detailing public preference for specific food packaging colors.
(C) A state government administrative directive regarding the distribution of local food subsidies.
(D) A scientific risk assessment report provided by experts to guide decisions.

23. Match the stages of standard-setting in List I with their legal implications in List II.
List I: Stages of standard-setting
P. Draft Notification
Q. Public Consultation
R. Final Gazette Notification
S. Implementation Grace Period
List II: Legal implications
I. Usually 30 to 60 days allowed for stakeholders to submit comments
II. The standard becomes a legally enforceable regulation
III. Initial publication indicating FSSAI's intent to regulate
IV. Transition time provided to FBOs to comply with new standards
(A) P-I, Q-II, R-III, S-IV
(B) P-III, Q-I, R-II, S-IV
(C) P-III, Q-IV, R-I, S-II
(D) P-II, Q-III, R-IV, S-I

24. Which of the following is the most appropriate description of the composition of FSSAI's Scientific Committee?
(A) It consists only of high-level political appointees nominated by the Ministry of Health.
(B) It includes only senior international public health scientists from the World Health Organization.
(C) It comprises Scientific Panel Chairpersons and independent experts.
(D) It is made up exclusively of active Food Safety Officers representing different states and UTs.

25. FSSAI needs to set a maximum residue limit (MRL) for a newly detected agricultural chemical in rice. Which conceptual pathway must this proposal follow?
(A) CEO recommendation → Review by the Ministry of Finance → Direct administrative Gazette Notification publication
(B) Central Advisory Committee proposal → Approval by State Food Commissioner → Enforcement by local FSOs
(C) Direct draft bill formulation and immediate inclusion into the parent Food Safety and Standards Act by Parliament
(D) Scientific Panel → Scientific Committee → Food Authority → Consultation → Final Gazette Notification

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26. Given below are two statements:
Statement I: During the standard-setting process, India is obligated to notify draft standards to the WTO-SPS committee.
Statement II: This notification process ensures that trading partners have an opportunity to comment on standards that may affect international trade.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

27. Identify the incorrect statement regarding the functioning of Scientific Panels.
(A) Members of the Scientific Panels are independent domain experts.
(B) Panel members are permanent, lifetime employees of FSSAI.
(C) Panels are responsible for providing scientific and technical advice.
(D) Panels may invite external experts for specific risk assessments.

28. Identify the correct pair regarding the regulatory timeline in standard setting.
(A) Immediate Enforcement – Applicable for all labelling changes without exception
(B) WTO-SPS Notification period – Typically 60 days
(C) Scientific Panel tenure – 3 years
(D) Public consultation phase – 5 days maximum

29. A scientific panel recommends limiting trans-fats to less than 2% in edible oils. The industry argues it is technologically unfeasible. How is this conflict resolved within the FSSAI structure?
(A) The Scientific Committee reviews both

CHAPTER 31

Structure, Functions, Standards and Enforcement of FSSAI

1. Under which section of the Food Safety and Standards Act, 2006, was the Food Safety and Standards Authority of India (FSSAI) established?
(A) Section 31
(B) Section 4
(C) Section 18
(D) Section 25

2. Directions: In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): The FSSAI acts as a single reference point for all matters relating to food safety and standards, regulations, and enforcement in India.
Reason (R): The Food Safety and Standards Act, 2006 consolidated eight distinct pre-existing food-related laws into a single legislative framework.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

3. Which of the following pre-existing legal instruments was NOT repealed and consolidated into the Food Safety and Standards Act, 2006?
(A) Bureau of Indian Standards Act, 1986
(B) Prevention of Food Adulteration Act, 1954
(C) Meat Food Products Order, 1973
(D) Fruit Products Order, 1955

4. Identify the correct statement regarding the organizational structure and appointment of the Chairperson of FSSAI.
(A) The Chairperson is appointed directly by the President of India on the recommendation of the Prime Minister after cabinet consultation.
(B) The Chairperson must be a sitting or retired judge of the Supreme Court of India or a state high court of equivalent standing.
(C) The Chairperson is appointed by the Central Government from amongst eminent persons in food science or public administration.
(D) The Chairperson serves an indefinite lifetime term to ensure absolute administrative continuity in food safety regulations.

5. Consider the following statements regarding the mandate of FSSAI:
I. Framing of regulations to lay down food safety standards.
II. Laying down mechanisms and guidelines for accreditation of certification bodies.
III. Fixing maximum retail prices (MRP) for essential food commodities.
IV. Providing scientific advice and technical support to the Central and State Governments.
Which of the above statement(s) is/are correct?
(A) I, II, and IV
(B) I, II, and III
(C) II, III, and IV
(D) I, III, and IV

6. Identify the incorrect pair regarding the functional divisions of FSSAI and their primary responsibilities.
(A) Science and Standards Division – Drafting food product regulations and guidelines for standard formulation
(B) Regulatory Compliance Division – Licensing, registration, and enforcing safety rules across food businesses
(C) Imports Division – Regulating the safety, compliance, and clearance of all food consignments entering Indian territory
(D) Risk Assessment Division – Managing administrative payroll and human resources of State Food Safety Officers

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not below the rank of Additional District Magistrate

37. What is the definition of "Proprietary Food" under FSS (Food Products Standards and Food Additives) Regulations?
(A) Food without specific standards but containing permitted ingredients and additives.
(B) Food products that contain proprietary chemical preservatives that are heavily regulated or banned globally.
(C) Specialized food items that are exclusively developed, manufactured, and sold by state-owned government monopolies.
(D) Traditional regional foods prepared locally using ancestral methods without undergoing industrial processing.

38. Match the enforcement personnel in List I with their specific statutory role in List II.
List I: Enforcement personnel
P. Commissioner of Food Safety
Q. Designated Officer
R. Food Safety Officer
S. Adjudicating Officer
List II: Statutory role
I. Imposes civil penalties for non-compliance
II. Draws samples of food and inspects premises
III. Oversees overall implementation of the Act within the State
IV. Investigates complaints and sanctions prosecutions
(A) P-I, Q-II, R-III, S-IV
(B) P-IV, Q-III, R-I, S-II
(C) P-III, Q-I, R-IV, S-II
(D) P-III, Q-IV, R-II, S-I

39. Which of the following best describes the core criterion distinguishing a Central License from a State License under FSSAI?
(A) The specific demographic profile, caste, and religious background of the Food Business Operator.
(B) Operational criteria like turnover, capacity, and multi-state presence.
(C) The technical classification and nature of the primary packaging material utilized by the manufacturer.
(D) The formal educational qualifications and safety training certifications of the food handlers employed.

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40. A local Food Safety Officer inspects a large-scale dairy processing unit operating under a Central License and discovers severe unhygienic conditions. What is the conceptually correct administrative protocol?
(A) The FSO immediately and permanently cancels the Central License of the dairy unit on the spot.
(B) The FSO unilaterally downgrades the operational Central License to a localized State License.
(C) The FSO reports the non-compliance to the Central Licensing Authority.
(D) The FSO is legally barred from inspecting the premises because state officers have no central jurisdiction.

41. Arrange the state enforcement authorities in sequential order from highest administrative rank to the field-level inspecting rank:
1. Food Safety Officer
2. Commissioner of Food Safety
3. Designated Officer
(A) 2, 3, 1
(B) 3, 2, 1
(C) 1, 3, 2
(D) 2, 1, 3

42. Identify the incorrect statement regarding the Adjudicating Officer under the FSSA, 2006.
(A) They can sentence an offender to life imprisonment.
(B) They possess full statutory powers to conduct formal inquiries for any offences punishable under the Act.
(C) They are legally vested with the powers of a civil court while actively holding an inquiry or hearing.
(D) They are officially nominated and notified by the respective State Government in the official gazette.

43. Identify the correct pair regarding the nature of the standard.
(A) Microbiological standards – Vertical standards detailing required nutritional and biological fortification limits
(B) Contaminants limits – Horizontal standards applying broadly across food categories
(C) Standard for Infant Milk Substitute – Horizontal standard for general use
(D) Permitted Food Colors – Vertical standard limited to packaged water

14. During an outbreak of a novel foodborne illness, FSSAI requires immediate technical guidance to issue national advisories. Which body within the FSSAI structure is primarily tasked with providing this urgent expert evaluation?
(A) The Central Licensing and Enforcement Authority
(B) The National Finance and Accounts Division
(C) The Scientific Committee and Panels
(D) The National Codex Contact Point Office

15. What is the primary cause-and-effect relationship intended by establishing the FSSAI under a single consolidated Act rather than maintaining the previous multi-departmental orders?
(A) Cause: Dissolution of the Bureau of Indian Standards; Effect: Mandatory international food imports only with high customs tariffs.
(B) Cause: Decentralization of scientific research; Effect: Complete autonomy of state and local governments in setting food safety standards.
(C) Cause: Introduction of strict criminal penalties; Effect: Rapid conversion of all private food businesses into state-owned entities.
(D) Cause: Consolidation of laws; Effect: Elimination of jurisdictional overlaps and establishment of a single reference point.

16. How many independent Scientific Panels does FSSAI currently utilize to cover various aspects of food safety and standards (as per the stabilized functional structure)?
(A) Exactly 5 panels
(B) Exactly 10 panels
(C) 21 panels
(D) 50 panels

17. Directions: In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): The Scientific Committee of FSSAI provides final scientific recommendations to the Food Authority.
Reason (R): The Scientific Committee is responsible for reviewing and coordinating the work of the various specialized Scientific Panels.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

18. Which of the following is NOT a recognized domain for a dedicated Scientific Panel under FSSAI?
(A) Food Additives, Flavourings, Processing Aids and Materials in Contact with Food
(B) Pesticides and Antibiotic Residues
(C) Genetically Modified Organisms and Foods
(D) Taxation and Tariff Rate Quotas for Food Items

19. Identify the correct statement regarding the standard-setting process within FSSAI.
(A) Draft standards are notified in the Gazette of India to invite public objections and suggestions.
(B) Standards are finalized secretly without any public consultation to prevent speculative trading by major food businesses.
(C) The World Trade Organization is completely excluded from the standard-setting process to safeguard domestic industries.
(D) Only government-owned food manufacturing corporations are legally permitted to provide feedback on these draft standards.

20. Consider the following steps in the standard-setting process of FSSAI:
I. Preparation of draft standard by the Scientific Panel
II. Final notification in the Gazette of India
III. Approval of the draft by the Food Authority
IV. Hosting the draft for public consultation and WTO-SPS notification
Which of the following represents the correct sequential combination?
(A) I → IV → III → II
(B) I → III → IV → II
(C) III → I → IV → II
(D) IV → I → III → II

21. Identify the incorrect pair regarding the standard-setting ecosystem.
(A) Gazette Notification – Restricts standard application only to exports
(B) Scientific Panel – Conducts primary toxicological risk assessment and drafts food standards
(C) Scientific Committee – Evaluates and resolves cross-panel scientific standard disputes
(D) Food Authority – Provides administrative

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FBO when a sample is lifted
(C) Form VI – Memorandum to Food Analyst
(D) Form III – Receipt for the seized article of food

52. What defines "Food Surveillance" in the context of FSSAI activities?
(A) The covert security recording and monitoring of food factory employees using administrative CCTV cameras.
(B) The calculation and assessment of custom import duties on essential agricultural food commodities.
(C) Systematic collection and analysis of food safety data for public health action.
(D) The exclusive oversight and compliance monitoring of commercial food advertising on television channels.

53. Match the parts of an enforcement sample in List I with their statutory destination in List II.
List I: Parts of an enforcement sample
P. Part 1
Q. Parts 2 & 3
R. Part 4
List II: Statutory destination
I. Sent to the Designated Officer for safe custody
II. Sent to the Food Analyst for immediate analysis
III. Sent to the National Food Laboratory for research
IV. Sent to an accredited laboratory if requested by the FBO
(A) P-II, Q-I, R-IV
(B) P-I, Q-II, R-III
(C) P-IV, Q-III, R-I
(D) P-II, Q-IV, R-I

54. What is the most appropriate primary goal of FSSAI's routine market surveillance programmes?
(A) To maximize revenue collection through heavy administrative and penal challans.
(B) To shut down and permanently penalize micro-scale food businesses operating locally.
(C) To actively promote proprietary synthetic foods over healthy traditional food products.
(D) To identify emerging safety risks and assess compliance trends.

55. An FSO strongly suspects that a batch of cooking oil is heavily adulterated with toxic argemone oil but the laboratory results will take time. What is the most appropriate immediate conceptual action under the Act?
(A) Wait indefinitely for the final laboratory report before taking any physical or legal action.
(B) Issue a temporary order to seize the oil or prohibit its sale.
(C) Directly arrest the Food Business Operator without obtaining a judicial warrant from the court.
(D) Direct the manufacturer to dilute the toxic oil with pure oil to lower the overall toxicity.

56. Given below are two statements:
Statement I: An FSO can issue an "Improvement Notice" to an FBO if they fail to comply with regulations, giving them time to rectify the issue.
Statement II: If the FBO fails to comply with the Improvement Notice, the Designated Officer may suspend their license.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

57. Identify the incorrect statement regarding the powers of a Food Safety Officer.
(A) An FSO can enter and inspect any place where food is manufactured at all reasonable hours.
(B) An FSO can seize any adulterant found in the possession of a food manufacturer.
(C) An FSO can break open any package containing suspected food if the owner refuses to open it.
(D) An FSO has power to permanently cancel any license unilaterally.

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58. Identify the correct pair connecting the surveillance tool to its function.
(A) Total Diet Study – Assessing background chemical exposure of populations via food
(B) Rapid Analytical Food Testing (RAFT) – Issuing formal import clearance certificates at seaport terminals
(C) Food Safety on Wheels – Arresting offenders in remote areas
(D) Epidemic Intelligence – Granting novel food approvals

59. An FSO intercepts a transport vehicle at midnight suspected of carrying synthetic milk.

The driver refuses to open the cargo hold. Based on the statutory powers of the FSO, what is the legitimate course of action?
(A) The FSO must immediately release the transport vehicle as inspections are strictly allowed only between 10 AM and 5 PM.
(B) The FSO is authorized to search the vehicle and seize the food, breaking the cargo hold if needed.
(C) The FSO must refer the entire jurisdictional matter to the state transport department and wait for their written clearance.
(D) The FSO has no police powers and can only impose a nominal traffic administrative fine for driver non-cooperation.

60. What is the intended cause-and-effect of utilizing an "Improvement Notice" rather than immediate prosecution for minor hygiene non-compliances?
(A) Cause: Serious intentional adulteration with toxic industrial chemicals; Effect: Automatically grants permanent legal immunity to the offending FBO.
(B) Cause: Minor defect; Effect: Allows FBO to correct issues, promoting compliance over penalization.
(C) Cause: Temporary administrative absence of an inspecting FSO; Effect: The FBO regulates their own biological and safety standards independently.
(D) Cause: Local government budget and revenue deficit; Effect: Ensures the inspecting authority collects mandatory daily compliance fees from the FBO.

61. What specific international standard must a primary food testing laboratory comply with to achieve NABL accreditation?
(A) ISO 17025
(B) ISO 9001
(C) ISO 22000 Food Safety
(D) ISO 14001

62. Directions: In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): The Referral Food Laboratory acts as the appellate laboratory in the FSSAI lab ecosystem.
Reason (R): If a Food Business Operator disputes the analytical report of a Primary Food Laboratory, the sample is sent to the Referral Food Laboratory for final binding analysis.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

63. Which of the following is NOT currently functioning as one of FSSAI's National Food Laboratories (NFLs)?
(A) NFL, Ghaziabad
(B) NFL, Kolkata
(C) NFL, JNPT Nhava Sheva
(D) NFL, Srinagar

64. Identify the correct statement regarding FSSAI's recognition of food testing laboratories.
(A) FSSAI exclusively recognizes and funds state or central government-owned testing laboratories.
(B) Laboratory recognition and accreditation is permanent and requires no further periodic reassessment.
(C) Private labs can be recognized if they have NABL accreditation.
(D) Officially recognized testing labs are legally barred from analyzing samples brought by consumers.

65. Consider the following functions of a Referral Food Laboratory:
I. Analysis of samples sent by the Designated Officer in case of appeals.
II. Investigation for the purpose of fixing standards for any article of food.
III. Direct issuance of food licenses to massive manufacturing units.
IV. Conducting inter-laboratory proficiency testing.
Which of the above statement(s) is/are correct?
(A) I, II, and III
(B) I, II, and IV
(C) II, III, and IV
(D) I, III, and IV

66. Identify the incorrect pair regarding the FSSAI laboratory ecosystem.
(A) National Food Laboratory – Apex level statutory laboratories directly managed by FSSAI
(B) State Food Testing Laboratory – Managed by respective State Governments
(C) Referral Food Laboratory – Handles appeal

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samples under Section 46(4) of the Act
(D) Primary Food Laboratory – Authorized only to test cosmetics and pharmaceuticals

67. Under the FSS Act, what is the definition of a "Food Analyst"?
(A) A qualified person appointed by the Commissioner or FSSAI to analyze food.
(B) A general laboratory technician operating without formal regulatory qualifications in an unregistered medical clinic.
(C) An untrained Food Business Operator independently evaluating their own product's safety limits before commercial sale.
(D) An everyday retail consumer who manually checks packaged food labels for date of manufacture and expiry dates.

68. Match the laboratory entity in List I with its core characteristic in List II.
List I: Laboratory entity
P. Primary Notified Laboratory
Q. Referral Laboratory
R. National Food Laboratory (NFL)
S. Food Safety on Wheels (FSW)
List II: Core characteristic
I. Mobile testing unit for rapid screening in remote areas
II. Handles initial statutory samples sent by FSO
III. Apex institute acting as a comprehensive centre of excellence
IV. Appellate body for disputed analytical results
(A) P-I, Q-III, R-II, S-IV
(B) P-IV, Q-II, R-I, S-III
(C) P-II, Q-IV, R-III, S-I
(D) P-III, Q-I, R-IV, S-II

69. What is the most appropriate reason for mandating NABL accreditation for FSSAI-notified laboratories?
(A) To ensure testing competence, reliable results, and traceability.
(B) To generate massive annual licensing revenue directly for the Quality Council of India.
(C) To strictly restrict and limit the absolute number of operating food laboratories in the country.
(D) To bypass and simplify the statutory requirements established under the parent Food Safety and Standards Act.

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70. An FBO's packaged fruit juice is found to contain excessive synthetic colors by a primary laboratory. The FBO strongly disputes this, claiming their internal lab cleared it. What is the conceptual statutory remedy available to the FBO?
(A) The FBO can initiate civil proceedings and directly sue the analyzing Food Analyst in a local consumer court.
(B) The FBO can legally ignore the adverse report if their own internal lab has achieved active ISO 22000 certification.
(C) The FBO must immediately surrender their entire manufacturing license with absolutely no statutory right to appeal.
(D) The FBO can appeal to the Designated Officer to send the sample to the Referral Lab.

71. Arrange the sequential flow of an enforcement sample experiencing an appeal process:
1. Primary Food Analyst issues an adverse report.
2. FSO lifts the sample and sends it to the Primary Notified Lab.
3. Designated Officer forwards the appeal sample to the Referral Lab.
4. FBO files an appeal against the primary report.
5. Referral Lab issues the final, binding analytical report.
(A) 2, 1, 4, 3, 5
(B) 1, 2, 3, 4, 5
(C) 2, 4, 1, 3, 5
(D) 4, 2, 1, 3, 5

72. Identify the incorrect statement regarding the timeline for food analysis.
(A) The Food Analyst must generally analyze the sample and send the report within 14 days of receipt.
(B) If the analysis cannot be completed within 14 days, the Food Analyst must inform the Designated Officer and the Commissioner of Food Safety.
(C) The Referral Laboratory is given an infinite amount of time to analyze appeal samples.
(D) Rapid screening tools can provide presumptive results much faster than statutory timelines.

73. Identify the correct pair regarding laboratory testing parameters.

(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

117. Identify the incorrect statement concerning an FBO's responsibilities during a recall.
(A) Destroy the product without notifying the Designated Officer.
(B) The FBO must identify the extent of the distribution of the implicated batch.
(C) The FBO must issue public warnings if the product has reached consumers.
(D) The FBO must submit periodic status reports of the recall process to the regulatory authority.

118. Identify the correct pair regarding the transition to FoSCoS.
(A) FoSCoS – Only available in the English language
(B) Standardized product approach – Used exclusively for the export of spices
(C) Endorsement module – Used to recall products automatically
(D) FLRS – Allowed arbitrary typing of non-standardized product names

119. An FBO successfully initiates and completes a Class I recall of an adulterated batch of baby food. What is the final case-based step required to close out the recall event with FSSAI?
(A) The FBO pays a fixed and non-refundable administrative 'recall completion fee' directly to the local FSO.
(B) Submit a final report detailing root cause, volume recovered, and CAPA.
(C) The FBO permanently and unconditionally surrenders their entire operational central manufacturing license.
(D) The FBO legally forces all working retail partners to sign strictly binding non-disclosure agreements.

120. What is the primary cause-and-effect of implementing a standardized product approach in FoSCoS?
(A) Cause: Direct national shortage of digital cloud server space; Effect: Permanent deletion of all historical legacy license records.
(B) Cause: Global diplomatic push for standardized international languages; Effect: Domestic FBOs must enter compliance data in French.
(C) Cause: Unstructured FLRS text entries; Effect: Standardized menus enable streamlined license approvals.
(D) Cause: Dramatic decline in local FBO registrations nationwide; Effect: Making all food safety licenses entirely optional for businesses.

121. What is the full form of FoSTaC, FSSAI's flagship training initiative?
(A) Food Standard Testing and Compliance
(B) Food Surveillance Tracking and Control
(C) Federal Strategy for Trade and Commerce
(D) Food Safety Training and Certification

122. Directions: In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): It is mandatory for all licensed food businesses to have at least one trained and certified Food Safety Supervisor (FSS) under the FoSTaC scheme.
Reason (R): A trained supervisor ensures that Good Manufacturing Practices (GMP) and Good Hygiene Practices (GHP) are continuously implemented on the premises.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

123. Which of the following is NOT a recognized category under the FSSAI "Food Safety Mitra" scheme?
(A) Digital Mitra
(B) Enforcement
(C) Trainer Mitra
(D) Hygiene Mitra

124. Identify the correct statement regarding "Food Safety on Wheels" (FSW).
(A) FSW are massive custom-built maritime cargo ships engineered to test bulk imported grains at deep sea.
(B) FSW are mobile labs deployed for rapid surveillance, awareness, and training.
(C) FSW operates exclusively as an mobile adjudicating court to punish offenders on the spot.
(D) FSW can perform complex LC-MS/MS

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(B) I, III, and IV
(C) I, II, and III
(D) I, II, and IV

81. Identify the incorrect pair regarding import alert systems.
(A) Non-Conformance Report (NCR) – Generated when an imported sample fails lab testing
(B) FIRA – Issued to clear perishable goods
(C) No Objection Certificate (NOC) – Issued when the consignment complies with all standards
(D) Product Information – Kept updated to trace the history of specific importers

82. What does "pre-arrival document scrutiny" primarily entail in the FSSAI import clearance process?
(A) Verifying and sensory testing the exact nutritional taste profile of the incoming raw or processed food.
(B) Conducting a comprehensive financial audit of the registered exporting country's commercial central bank.
(C) Translating all printed packaging text from foreign languages into major regional Indian dialects and scripts.
(D) Checking documents like the Bill of Entry and country of origin certificate before inspection.

83. Match the FSSAI import terminology in List I with its description in List II.
List I: FSSAI import terminology
P. ICEGATE
Q. FICS
R. Authorized Officer
S. Visual Inspection
List II: Description
I. Checking for structural integrity, pests, and labeling compliance of the cargo
II. The central customs portal linked with FSSAI's system
III. FSSAI's dedicated digital module for import clearance
IV. Official appointed by FSSAI to oversee clearance at specific ports
(A) P-II, Q-III, R-IV, S-I
(B) P-III, Q-II, R-I, S-IV
(C) P-IV, Q-I, R-II, S-III
(D) P-I, Q-IV, R-III, S-II

84. What is the most appropriate purpose of issuing a Food Import Rejection Alert (FIRA)?
(A) To formally congratulate a registered importer on successfully bringing a highly standardized new product to India.
(B) To strictly mandate an immediate retail price reduction on all the imported commercial food items at customs.
(C) To inform authorities that a consignment poses a safety risk, thereby preventing its entry.
(D) To automatically and permanently renew an importer's central FSSAI license without undergoing audits.

85. An importer attempts to bring a consignment of packaged cheese with a total declared shelf life of 12 months. At the time of customs clearance, the cheese has only 5 months of shelf life remaining. Conceptually, what will the Authorized Officer do?
(A) Reject because regulations require 60% of shelf life remaining at clearance.
(B) Clear the consignment immediately at the port because five months is considered a long time for retail sales.
(C) Double the standard import duty on the dairy cargo and immediately clear the consignment for distribution.
(D) Send the cheese cargo to an appellate Referral Laboratory to formally check if it has biologically spoiled.

86. Given below are two statements:
Statement I: During visual inspection, if an imported food consignment lacks the mandatory FSSAI logo and license number on its principal display panel, the Authorized Officer may allow it to be rectified at the customs bonded warehouse.
Statement II: Rectifiable labelling defects include adding a completely new ingredient list that was originally missing.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

87. Identify the incorrect statement regarding the testing of imported food consignments.
(A) The laboratory must notify the AO of the test results via the FICS portal.
(B) Samples drawn by the Authorized Officer

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and comprehensive FSMS structure.
(B) FSSAI mandates TPA for certain high-risk food businesses.
(C) FSSAI uses TPA reports to adjust the risk profile of the FBO.
(D) A TPA strips the Food Safety Officer of their right to inspect.

103. Identify the correct pair regarding product approval evaluations.
(A) Scientific Committee – A body composed of FBO CEOs who vote on product approvals
(B) Safety Dossier – Contains toxicity and clinical studies
(C) Product Approval Fee – Paid directly to the evaluating scientists
(D) Post-Market Surveillance – Exclusively the responsibility of the consumer

104. During a Third-Party Audit of a meat processing facility, the auditor identifies a "Critical Non-Conformity" (e.g., cross-contamination of raw and cooked meat). As per protocol, what is the case-based action the auditor must take?
(A) The auditor ignores the issue entirely if the food business operator formally promises to fix it next fiscal year.
(B) The auditor manually fixes the technical plumbing issue themselves using their own specialized cleaning equipment.
(C) The auditor immediately alerts FSSAI and the FBO of the public health risk.
(D) The auditor utilizes citizen arrest powers to immediately hand the dairy plant manager over to local police forces.

105. What is the primary cause-and-effect relationship underpinning the requirement for Novel Food approval?
(A) Cause: Direct state policy to monopolize the entire domestic food industry; Effect: Implementation of a complete and permanent ban on all foreign recipes.
(B) Cause: Massive national agricultural commodity surplus; Effect: Government actively encouraging the public consumption of experimental chemical compounds.
(C) Cause: Radical simplification and speed-up of central bureaucracy; Effect: Quick and automatic approval clearance of all newly invented food ingredients.
(D) Cause: Safety risks of unknown ingredients; Effect: Mandatory scientific assessment before market access to protect consumers.

106. In which year did FSSAI officially launch the Food Safety Compliance System (FoSCoS) across India, replacing the legacy Food Licensing and Registration System (FLRS)?
(A) 2020
(B) 2011
(C) 2015
(D) 2023

107. Directions: In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): All licensed Food Business Operators must have an up-to-date, documented food recall plan.
Reason (R): A recall plan ensures swift removal of unsafe food from the market, mitigating public health risks and minimizing the impact of a food crisis.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

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108. Which of the following is NOT typically a step in the food recall process managed by an FBO?
(A) Initiation of the recall upon detecting a hazard.
(B) Arresting the retail shop owners who sold the product.
(C) Notifying FSSAI and the relevant State Authority.
(D) Retrieval and safe disposal or correction of the affected product.

109. Identify the correct statement regarding crisis communication during a food safety incident.
(A) Sharing timely and accurate risk info with the public to prevent undue alarm.
(B) All communication regarding safety should be delayed indefinitely by the ministry to avoid major market panic.
(C) Only the specific offending food business is legally permitted to draft and issue public press releases.
(D) FSSAI intentionally avoids communicating with or notifying State Food Commissioners during a major safety crisis.

consumption.
II. Foods containing ingredients produced using targeted genetic modification (where applicable).
III. Traditional foods prepared using standard regional recipes.
IV. Foods produced by new processes that significantly alter their nutritional value.
Which of the above statement(s) is/are correct?
(A) I, III, and IV
(B) II, III, and IV
(C) I, II, and III
(D) I, II, and IV

96. Identify the incorrect pair regarding Third-Party Audits (TPA).
(A) Empanelled Agency – An auditing body officially recognized by FSSAI
(B) FSMS Audit – Evaluation of a facility's Food Safety Management System
(C) Audit Report – Document granting automatic immunity from FSSAI inspections
(D) Corrective Action – Steps taken by the FBO to rectify non-conformities found during the audit

97. Under the non-specified food and product approval regulations, what does FSMP stand for?
(A) Food Safety Management Protocol
(B) Food for Special Medical Purposes
(C) Federal Standard for Manufacturing Practices
(D) Formulated Synthetic Meat Products

98. Match the product category in List I with its characteristic in List II.
List I: Product category
P. Novel Food
Q. Proprietary Food
R. Health Supplement
S. FSMP
List II: Characteristic
I. Standardized ingredients without specific vertical compositional standards
II. Intended to supplement the diet, containing concentrated nutrients
III. Intended for dietary management of individuals suffering from a specific disease
IV. No prior history of safe human consumption in India
(A) P-I, Q-IV, R-III, S-II
(B) P-IV, Q-II, R-I, S-III
(C) P-III, Q-I, R-IV, S-II
(D) P-IV, Q-I, R-II, S-III

99. What is the most appropriate operational advantage for an FBO successfully undergoing a recognized Third-Party Audit?
(A) They may face less frequent routine inspections by state officers.
(B) They are permanently exempt from paying any corporate or income tax under the national tax laws.
(C) They are allowed to completely bypass all mandatory vertical and horizontal packaging labelling regulations.
(D) They are legally authorized to directly issue regulatory operating licenses to other smaller localized FBOs.

100. An FBO wishes to launch an energy bar fortified with a newly discovered synthetic amino acid not listed in any existing FSSAI regulation. Conceptually, what is the mandatory regulatory pathway?
(A) Launch the novel product immediately into the commercial market as a standard proprietary food without prior notice.
(B) Obtain a localized state license from the Designated Officer and immediately commence large-scale production.
(C) Apply for non-specified product approval by submitting a safety dossier.
(D) Send a random sample to any primary lab and if it passes the total plate count test, immediately start selling.

101. Arrange the sequential steps in the FSSAI Product Approval Process:
1. Payment of the application fee and submission via the digital portal.
2. Review of the scientific dossier by the relevant Scientific Panel.
3. FBO submits the safety data and detailed application.
4. Approval/Rejection by the Food Authority.
(A) 1, 3, 2, 4
(B) 3, 1, 2, 4
(C) 1, 2, 3, 4
(D) 3, 2, 1, 4

102. Identify the incorrect statement regarding the implications of a Third-Party Audit (TPA).
(A) A satisfactory audit report formally indicates that the FBO has fully implemented a robust

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are sent exclusively to foreign laboratories.
(C) If the sample fails, the importer has the right to request a re-test at a referral laboratory.
(D) For highly perishable items, provisional NOCs may be granted subject to specific conditions.

88. Identify the correct pair regarding the integration of customs and food safety.
(A) Risk Management System (RMS) – Randomly blocks legitimate exports from India
(B) Bill of Entry – Document generated by FSSAI after lab testing
(C) CBIC – The nodal authority operating ICEGATE, integrated with FICS
(D) Port Health Officer – Exclusively handles FSSAI import clearance for machinery

89. An imported shipment of almonds is rejected by the primary lab for exceeding Aflatoxin limits. The importer appeals the decision and requests a re-test. Under the FSSAI import regulations, which laboratory will test the appeal sample?
(A) The exact same primary laboratory to confirm their initial result.
(B) The private internal laboratory of the exporter.
(C) Any unaccredited university laboratory chosen by the importer.
(D) A designated Referral Food Laboratory.

90. What is the primary cause-and-effect of integrating FICS with the Customs Risk Management System (RMS)?
(A) Cause: Risk-based data analytics; Effect: Faster clearance of low-risk goods while targeting high-risk imports.
(B) Cause: Complete administrative automation; Effect: Total elimination of the Authorized Officer role at all major seaports.
(C) Cause: Heavy server load on the digital networks; Effect: Frequent administrative delays in importing essential medical products.
(D) Cause: Complete eradication of all customs import duties; Effect: Massive flooding of the domestic market with cheap food products.

91. According to FSSAI guidelines, high-risk Food Business Operators (like dairy or meat processing units) are generally encouraged or mandated to undergo Third-Party Audits (TPA) at what frequency?
(A) Once every 5 years to verify basic standards
(B) Once or twice a year based on risk
(C) Once every 10 years
(D) Only when there is a foodborne outbreak

92. Directions: In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): Proprietary foods, which use permitted ingredients and additives but have no specified vertical standards, do not require prior FSSAI product approval.
Reason (R): Product approval is specifically mandated for novel foods, non-specified foods, and new food additives that have no history of safe use in India.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

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93. Which of the following categories of food generally does NOT require prior "Product Approval" from FSSAI before manufacturing or importing?
(A) Standardized cow milk
(B) Novel foods containing insect protein
(C) Foods with newly synthesized botanical extracts not listed in regulations
(D) Specialized pre-biotic formulations using unapproved microbial strains

94. Identify the correct statement regarding FSSAI-empanelled Third-Party Auditing (TPA) agencies.
(A) They possess full police and statutory powers to immediately arrest non-compliant food business operators.
(B) Their audit reports are kept entirely confidential and are never shared with FSSAI.
(C) They conduct objective assessments of FBOs' FSMS compliance.
(D) They are solely responsible for formulating the national food safety standards.

95. Consider the conditions defining "Novel Foods" under FSSAI regulations:
I. Foods that may not have a history of human

110. Consider the following features of FoSCoS:
I. Shift from a text-box-based approach to a standardized product approach.
II. Integration with online payment gateways.
III. Module for automatic generation of import NOCs without lab testing.
IV. Linkage with KoBoToolbox for inspection reports.
Which of the above statement(s) is/are correct?
(A) I, II, and III
(B) II, III, and IV
(C) I, II, and IV
(D) I, III, and IV

111. Identify the incorrect pair regarding the classification of food recalls.
(A) Class I Recall – Situations where there is a reasonable probability that consumption will cause serious adverse health consequences or death.
(B) Class II Recall – Situations where consumption may cause temporary or medically reversible adverse health consequences.
(C) Mock Recall – A simulated exercise conducted by the FBO to test the effectiveness of their recall plan.
(D) Class III Recall – Situations involving critical biological hazards leading to immediate outbreaks.

112. Under FSSAI guidelines, how is a "Food Recall" formally defined?
(A) A commercial marketing strategy designed to relaunch an old, unpopular product with brand new visual packaging.
(B) The agricultural practice of returning raw or expired ingredients directly back to the original source farmer.
(C) Removing food from the market due to safety risks or non-compliance.
(D) Withdrawing food from circulation purely because they are not generating enough corporate profit.

113. Match the recall scenario in List I with its corresponding classification in List II.
List I: Recall scenario
P. Botulinum toxin found in canned soup
Q. Incorrectly formatted nutritional label (no safety risk)
R. Undeclared mild food color (causing mild allergic reaction)
S. Simulated traceability test
List II: Classification
I. Class III Recall
II. Class I Recall
III. Mock Recall
IV. Class II Recall
(A) P-I, Q-II, R-III, S-IV
(B) P-II, Q-I, R-IV, S-III
(C) P-IV, Q-III, R-II, S-I
(D) P-II, Q-IV, R-I, S-III

114. What is the most appropriate primary role of FSSAI during a nationwide food safety crisis (e.g., widespread adulteration of a staple commodity)?
(A) Fining individual everyday retail consumers for inadvertently buying the non-compliant product.
(B) Temporarily relocating all working FSSAI administrative staff to international testing laboratories.
(C) Immediately shutting down the entire manufacturing food industry of the country without a hearing.
(D) Coordinating multi-state actions, communicating risk, and issuing central directives.

115. An FBO discovers that a recent batch of their baked cookies inadvertently contains peanut traces not declared on the label. Conceptually, what is the immediate regulatory obligation?
(A) Initiate a recall, halt distribution, and inform the State Authority.
(B) Wait for a formal written consumer complaint to be filed with local officials before taking any action.
(C) Sell the defective batch at a heavy commercial discount to clear warehouses and retail inventory quickly.
(D) Deny any corporate responsibility or liability since the high-heat baking process kills all potential bacteria.

116. Given below are two statements:
Statement I: FoSCoS was developed to ensure a paradigm shift from a multi-portal, state-centric system to a pan-India cloud-based, unified compliance system.
Statement II: FoSCoS does not allow minor modifications to existing licenses; FBOs must apply for a new license every time they change their address.
(A) Both Statement I and Statement II are true.

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(A) Total Plate Count – Measured using an atomic absorption spectrophotometer (AAS)
(B) Heavy Metals – Analysed exclusively by visual inspection
(C) Moisture content – Determined by a Polymerase Chain Reaction (PCR) machine
(D) Aflatoxin limits – Evaluated using HPLC or LC-MS/MS

74. A Primary Food Lab reports the presence of Salmonella in a batch of spices. The FBO appeals. The Referral Food Lab analyses the counterpart sample and reports Salmonella is ABSENT. In this legal context, what is the consequence?
(A) The Referral Lab's report supersedes the Primary report and is final.
(B) The original Primary Lab's report is fully upheld because they conducted the primary testing first.
(C) The inspecting FSO must mathematically average the analytical results of both laboratories.
(D) A third accredited international laboratory must be formally consulted by state officials to break the tie.

75. What is the cause-and-effect rationale behind FSSAI implementing the Indian Food Laboratory Network (INFoLNET)?
(A) Cause: Direct shortage of certified glass test tubes; Effect: Immediate central ban on all routine microbiological safety testing.
(B) Cause: Manual lab reporting; Effect: Centralized portal ensuring real-time data integration and transparency.
(C) Cause: Excessive annual profits of registered private labs; Effect: Complete nationalization of all private food laboratories.
(D) Cause: Inadequate mobile and local telecommunication networks; Effect: Mandatory switching back to old paper-based testing reports.

76. In the context of the import clearance system, FSSAI is integrated with the SWIFT system. What does SWIFT stand for?
(A) Secure Worldwide Import Food Transactions
(B) Single Window Interface for Facilitating Trade
(C) Standardized Warning Integration for Food Testing
(D) Systematic Window for International Freight Tracking

77. Directions: In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): No food article can be imported into India without a No Objection Certificate (NOC) from FSSAI.
Reason (R): The Food Import Clearance System (FICS) ensures that imported food complies with domestic food safety standards before entering the market.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

78. Which of the following food consignments is typically EXEMPT from the standard FSSAI commercial import clearance process?
(A) Frozen seafood imported specifically for commercial retail sale in large supermarkets.
(B) Canned beans imported by a wholesale distributor.
(C) Food articles imported strictly for personal consumption.
(D) Edible oils imported in bulk for blending and repacking.

79. Identify the correct statement regarding the Risk Management System (RMS) implemented by FSSAI for imports.
(A) The RMS system strictly mandates that 100% of all commercial imported food consignments undergo laboratory testing.
(B) The RMS is technically designed to automatically clear all food imports from neighboring countries without inspection.
(C) The RMS exclusively and directly relies on sensory physical taste tests conducted by port customs authorities.
(D) The RMS flags specific consignments for sampling based on risk profiles.

80. Consider the following duties performed at ports of entry:
I. Pre-arrival document scrutiny.
II. Visual inspection of the consignment.
III. Drawing of samples for laboratory testing.
IV. Fixing the domestic retail price of the imported good.
Which of the above statement(s) is/are correct?
(A) II, III, and IV

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pesticide residue analysis equivalent to a National Food Lab.

125. Consider the following roles intended for a "Digital Mitra" under the Food Safety Mitra scheme:
I. Assisting FBOs in filing online applications for new licenses.
II. Helping FBOs file annual returns on the FoSCoS portal.
III. Arresting vendors who do not have a license.
IV. Assisting with modification or renewal of licenses.
Which of the above statement(s) is/are correct?
(A) I, II, and IV
(B) I, II, and III
(C) II, III, and IV
(D) I, III, and IV

126. Identify the incorrect pair regarding the Food Safety Mitra ecosystem.
(A) Hygiene Mitra – Audits the hygiene of FBO premises
(B) Digital Mitra – Assists with FoSCoS portal navigation
(C) Penalty Mitra – Collects cash fines from FBOs
(D) Trainer Mitra – Conducts FoSTaC training sessions

127. What is the core concept behind FSSAI's "Anytime Anywhere Testing" initiative?
(A) Allowing registered foreign trade partner countries to strictly test Indian agricultural food exports directly at their borders.
(B) Administratively forcing state public laboratories to operate twenty-four hours a day without hiring any additional technical staff.
(C) Completely replacing all high-end laboratory equipment like GC-MS with simple consumer litmus paper tests to save state budgets.
(D) Empowering consumers with RAFT kits and using mobile labs for rapid screening.

128. Match the FoSTaC training level in List I with its target audience in List II.
List I: FoSTaC training level
P. Basic Level
Q. Advance Level
R. Special Level
List II: Target audience
I. High-risk food sectors like Dairy, Meat, and Edible Oil processing
II. Micro and small food businesses, street food vendors
III. State/Central licensed FBOs involved in general manufacturing and catering
(A) P-I, Q-II, R-III
(B) P-III, Q-I, R-II
(C) P-II, Q-III, R-I
(D) P-II, Q-I, R-III

129. What is the most appropriate main objective of the Food Safety Mitra programme?
(A) To systematically replace the statutory regulatory role of field Food Safety Officers with private, unverified individuals.
(B) To create trained professionals who facilitate compliance and hygiene at the grassroots level.
(C) To completely privatize the entire state-level and national-level food safety legal enforcement mechanism.
(D) To commercially sell corporate FSSAI-branded merchandise and educational brochures directly to licensed food businesses.

130. A local street food vendor wishes to improve hygiene but lacks digital literacy and formal education. Conceptually, which FSSAI capacity-building initiatives are most directly applicable to them?
(A) Third-Party Audit (TPA) and comprehensive NABL Laboratory Accreditation
(B) Product Approval via Scientific Panels
(C) Integration with the ICEGATE customs portal
(D) Clean Street Food Hub, Digital Mitra, and Basic FoSTaC.

131. Arrange the typical deployment sequence of a Food Safety on Wheels (FSW) unit during a local outreach campaign:
1. FSW travels to a designated local market or remote village.
2. Rapid testing of consumer-brought samples is conducted on the spot.
3. State authorities plan the monthly route map for the FSW.
4. Data is aggregated and uploaded to FSSAI for surveillance trends.
(A) 3, 1, 2, 4
(B) 1, 2, 3, 4
(C) 3, 2, 1, 4
(D) 4, 3, 1, 2

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structure. Specific Central Designated Officers are appointed to oversee licensing, inspections, and enforcement within railway premises. Therefore, a state officer must defer formal licensing and prosecution actions to the designated central railway authority.

45. (A) Cause: Independent panels separate from administration; Effect: Decisions are unbiased and based on science.
The deliberate separation of scientific risk assessment from administrative risk management ensures that standard formulation is protected from political or commercial influence. Independent scientific panels focus entirely on analyzing hazards and evaluating clinical and biological data. Consequently, the resulting food safety decisions are objectively based on rigorous science, enhancing public confidence in national food safety regulations.

46. (C) Once in six months or per risk-based protocols
Under established inspection guidelines, Food Safety Officers are directed to monitor licensed food businesses regularly. High-risk units are typically inspected at least once every six months, or in accordance with specific risk-based inspection frequencies. This systematic scheduling ensures continuous hygiene compliance, helps prevent contamination incidents, and optimizes regulatory resources by focusing on high-risk sectors.

47. (A) Both A and R are true and R is the correct explanation of A.
Surveillance sampling is a monitoring tool used by regulatory authorities to map contamination trends and identify emerging food safety risks. Because these samples are not collected under the strict legal protocols and documented chain-of-custody required for enforcement, they cannot be used to initiate prosecution. Both statements are true, and the reason directly explains the assertion.

48. (C) Finalizing budgets for testing laboratories.
Section 38 of the parent Act details the statutory duties of a Food Safety Officer, which include taking food samples, seizing adulterated stocks, and inspecting food premises. Budgetary allocation and financial management for testing laboratories are administrative and fiscal duties handled by senior state ministry officials and the central authority, not by field-level inspecting officers.

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49. (B) The National Milk Survey is a targeted surveillance program.
Market surveillance is a proactive regulatory tool used to evaluate the safety and compliance of food products in the market. The National Milk Survey is a prime example of a large-scale, structured surveillance program designed to map milk quality across states. These surveillance findings are shared with scientific panels to help refine national standards and policies.

50. (D) I, II, III, and IV
When conducting enforcement sampling, the Food Safety Officer must strictly follow legal protocols. The officer must pay the cost of the sample to the operator, divide the sample into four equal parts, securely seal and sign each part, and immediately dispatch the first part to the Food Analyst. These steps ensure legal validity and protect the operator.

51. (A) Form I – Health certificate for food handlers
Form I is not used as a health certificate for food handlers under the statutory enforcement regulations. Instead, standard forms such as Form V A, Form VI, and Form III are legally designated for serving notices, sending memorandums to analysts, and issuing receipts for seized food articles. Health certificates follow distinct regulatory templates within the hygiene schedules.

52. (C) Systematic collection and analysis of food safety data for public health action.
Food surveillance refers to the continuous, systematic collection, analysis, and interpretation of safety data from the marketplace. This process is designed to monitor compliance trends, identify emerging chemical or microbiological hazards, and detect potential adulteration patterns. The resulting information is utilized to guide targeted enforcement, plan public health interventions, and update national food standards.

53. (A) P-II, Q-I, R-IV
The division of an enforcement sample into four parts serves distinct legal purposes. Part one is sent immediately to the Food Analyst for analysis. Parts two and three are sent to the Designated Officer for secure custody as backup. Part four is sent to an accredited laboratory if the food business operator requests a separate analysis.

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security reasons.
(B) FSSAI has an RTI cell with CPIOs to handle queries from citizens.
(C) RTI requests related to food safety can only be filed by licensed food business operators.
(D) FSSAI mandates a fee of ₹10 for filing an RTI application.

140. Consider the following topics:
I. Number of licenses and registrations issued.
II. Summary of enforcement activities, civil penalties, and prosecutions.
III. Secret recipes of proprietary food businesses.
IV. Financial accounts and auditing reports of the Authority.
Which of the above statement(s) is/are correct?
(A) I, II, and III
(B) I, II, and IV
(C) II, III, and IV
(D) I, III, and IV

141. Identify the incorrect pair regarding FSSAI's digital portals and their main purpose.
(A) DART – Online portal for FBOs to pay their corporate income tax
(B) FoSCoS – Processing licenses and registrations
(C) FoSCoRIS – Digital inspection system for field officers
(D) INFoLNET – Digital platform for managing the laboratory testing workflow

142. What defines the "Food Safety Compliance through Regular Inspection and Sampling" (FoSCoRIS) system?
(A) A legacy and paper-based filing archival system used for documenting municipal licenses since 2011.
(B) A satellite tracking system used to monitor the geographical movement of agricultural crops.
(C) An application replacing manual inspections with digital checklists for FSOs.
(D) A digital currency introduced by FSSAI for penalty payments.

143. Match the FSSAI digital initiative in List I with its core function in List II.
List I: FSSAI digital initiative
P. INFoLNET
Q. FICS
R. FoSCoRIS
S. DART Booklet
List II: Core function
I. Import clearance system for customs integration
II. Quick tests to detect common adulterants at home
III. LIMS (Laboratory Information Management System) for food labs
IV. Tablet-based inspection tool for State Food Safety Officers
(A) P-I, Q-II, R-III, S-IV
(B) P-IV, Q-III, R-II, S-I
(C) P-III, Q-IV, R-I, S-II
(D) P-III, Q-I, R-IV, S-II

144. What is the most appropriate impact of the DART (Detect Adulteration with Rapid Test) manual on consumers?
(A) It provides highly complex and academic mathematical formulas to calculate background chemical decay in packaged food.
(B) It trains everyday retail consumers to manually perform complex High-Performance Liquid Chromatography procedures.
(C) It empowers consumers to perform simple, home-based tests to detect common adulterants.
(D) It grants full statutory, legal, and executive powers directly to private consumers to arrest suspect shopkeepers.

145. A consumer suspects the milk they purchased is adulterated with starch. Using the principles promoted by FSSAI's digital awareness campaigns, what conceptual action can they take at home?
(A) Upload a photograph of the milk to INFoLNET to get a digital certificate.
(B) Use iodine tincture; blue color indicates starch.
(C) Heat the milk to 100°C and measure the exact evaporation rate mathematically.
(D) There is no home test; they must send it to the National Food Laboratory immediately.

146. Given below are two statements:
Statement I: As part of its transparency mandate, FSSAI publishes the minutes of scientific panel meetings and draft standards on its official website for public review.
Statement II: However, confidential commercial information (like proprietary recipes) submitted during product approval is protected from public

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9. (D) A framework comprising risk assessment, risk management, and risk communication.
The comprehensive risk analysis framework implemented by national regulators consists of three distinct, interconnected components. Risk assessment provides the scientific evaluation of hazards, risk management involves policy selection and regulatory enforcement, and risk communication ensures the exchange of information among stakeholders. This structured approach ensures that all food safety decisions are objective, transparent, and scientifically sound.

10. (A) The Commissioner should escalate the issue to the Central Advisory Committee for guidance.
When enforcement interpretations of national food safety standards conflict across different districts, the State Food Safety Commissioner must seek administrative resolution. Escalating the matter to the Central Advisory Committee ensures a coordinated evaluation. This statutory committee is designed to harmonize enforcement practices, resolve operational disputes, and maintain regulatory consistency between the central authority and state-level agencies.

11. (A) 4, 2, 3, 1
The administrative hierarchy of food safety enforcement flows downward from the highest central executive to field-level officers. The Chief Executive Officer of the central authority occupies the apex position. Below the central level, the Commissioner of Food Safety directs state-wide activities. The Designated Officer manages district operations, and the Food Safety Officer acts as the primary field inspector.

12. (B) The CEO of FSSAI holds veto power over all scientific panel recommendations.
The Food Authority consists of a Chairperson and twenty-two members, with a mandatory requirement that one-third of these members must be women. The Chief Executive Officer acts as the member-secretary but does not possess veto power over independent scientific panel recommendations. Scientific decisions must remain unbiased, evidence-based, and free from unilateral executive or administrative vetoes.

13. (A) Scientific Panels – Independent scientific experts evaluating specific food hazards
Scientific Panels are constituted of independent domain experts who provide specialized risk evaluations on specific hazards, such as additives or contaminants. The Food Authority comprises twenty-two members rather than thirty-five. Designated Officers oversee district licensing rather than import clearance at ports, while Adjudicating Officers handle civil penalties at the administrative district level, not high court criminal trials.

14. (C) The Scientific Committee and Panels
During a sudden outbreak of a novel foodborne illness, the authority relies on scientific expertise to formulate immediate advisories. The Scientific Committee and its specialized Panels are specifically designed to provide rapid risk assessments and scientific opinions. This expert evaluation ensures that national emergency guidelines are based on robust biological evidence and targeted public health considerations.

15. (D) Cause: Consolidation of laws; Effect: Elimination of jurisdictional overlaps and establishment of a single reference point.
The historical consolidation of multiple fragmented food-related laws into a single legislative framework was designed to resolve regulatory inefficiencies. Previously, overlapping jurisdictions between ministries caused significant enforcement confusion. Establishing a unified authority successfully eliminated these conflicts, creating a single, clear reference point for food businesses, scientific risk assessment, and standardized nationwide enforcement protocols.

16. (C) 21 panels
The Food Safety and Standards Authority of India utilizes twenty-one highly specialized Scientific Panels. These panels cover diverse regulatory domains, ranging from biological hazards and pesticides to novel foods and packaging materials. This extensive panel structure ensures that every specific aspect of food safety receives detailed scientific scrutiny from independent academic and industry experts.

17. (A) Both A and R are true and R is the correct explanation of A.
The Scientific Committee of the authority holds the responsibility of providing final scientific advice on standard formulation. It consists of the chairpersons of all specialized Scientific Panels and independent experts. By actively reviewing and coordinating the work of various panels, the committee ensures scientific consistency across

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ANSWERS

1. (B) Section 4
Section 4 of the Food Safety and Standards Act, 2006, mandates the establishment of the Food Safety and Standards Authority of India. This statutory provision officially empowers the Central Government to establish the apex food regulator. It outlines the constitutional framework, administrative headquarter location in Delhi, and the general oversight structure of the authority.

2. (A) Both A and R are true and R is the correct explanation of A.
The Food Safety and Standards Act of 2006 consolidated various fragmented food laws to eliminate jurisdictional multi-departmental confusion. By unifying these pre-existing regulations under a single legislative umbrella, FSSAI was systematically positioned as the sole apex regulator. Therefore, both statements are factually correct, and the consolidation directly explains FSSAI's role as a single reference point.

3. (A) Bureau of Indian Standards Act, 1986
The Food Safety and Standards Act, 2006, repealed and consolidated eight older food-related orders and acts, including the Prevention of Food Adulteration Act and the Fruit Products Order. However, the Bureau of Indian Standards Act, 1986, remains an independent legislative framework. It continues to regulate industrial product standards, including voluntary certification schemes, outside the direct purview of FSSAI.

4. (C) The Chairperson is appointed by the Central Government from amongst eminent persons in food science or public administration.
The Chairperson of the Food Safety and Standards Authority of India is officially appointed by the Central Government. Candidates are selected from highly eminent individuals with specialized expertise in food science, public health, or public administration. This executive appointment ensures that the administrative leadership possesses the necessary professional background to effectively guide national food safety policies.

5. (A) I, II, and IV
The statutory mandate of the Food Safety and Standards Authority of India includes framing comprehensive food safety regulations, establishing robust accreditation mechanisms for certification bodies, and providing technical advice to governments. However, the authority has no legal jurisdiction over economic pricing controls. Setting the maximum retail price of essential commodities is governed by separate consumer affairs regulations.

6. (D) Risk Assessment Division – Managing administrative payroll and human resources of State Food Safety Officers
The Risk Assessment Division is scientifically tasked with evaluating biological, chemical, and physical hazards in food products. It relies on scientific data to identify potential food safety risks and support policy formulation. Managing administrative payroll and human resources for state-level enforcement officers is an administrative or human resource function, completely unrelated to scientific risk assessment methodologies.

7. (B) Advises on prioritization of work and identifies potential risks.
The Central Advisory Committee serves as a vital statutory body within the regulatory framework of the authority. Its primary mandate is to facilitate close cooperation between the central authority, state enforcement agencies, and stakeholder groups. The committee systematically advises on work prioritization, operational planning, and the timely identification of emerging microbiological or chemical safety risks.

8. (C) P-III, Q-I, R-II, S-IV
The Chairperson presides over the authority, while the Chief Executive Officer functions as the legal representative and administrative head. The Scientific Committee provides overarching scientific opinions by coordinating specialized panels. The Central Advisory Committee assists in identifying potential risks and prioritizing regulatory tasks. These distinct roles ensure a balanced, functioning structure for policy formulation and enforcement.

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Sanitary and Phytosanitary Measures committee. This transparent notification process ensures that global trading partners can review and comment on standards. This step prevents arbitrary trade barriers and harmonizes domestic safety regulations with international standards.

27. (B) Members of the Scientific Panels are permanent, lifetime employees of FSSAI.
Members of the specialized Scientific Panels are independent, external experts selected from leading academic, research, and medical institutions. They are appointed for a specific, non-permanent tenure and are not permanent, lifetime employees of the central authority. This operational structure preserves the objectivity, scientific integrity, and independence of the hazard evaluation and risk assessment process.

28. (B) WTO-SPS Notification period – Typically 60 days
The World Trade Organization Sanitary and Phytosanitary notification period is typically set at sixty days, allowing international stakeholders adequate time to submit their feedback. In contrast, the standard tenure for a Scientific Panel is three years, and the public consultation phase within India generally spans sixty days to ensure thorough, inclusive stakeholder participation.

29. (A) The Scientific Committee reviews both feasibility and risk assessment to advise the Authority.
When conflict arises between strict scientific safety recommendations and practical industry feasibility, the regulatory framework provides a structured resolution process. The Scientific Committee serves to evaluate the technical evidence, biological risks, and socioeconomic comments. It then delivers balanced, comprehensive advice to the Food Authority, ensuring that public health remains paramount while considering practical manufacturing limitations.

30. (C) Cause: Requirement for transparency; Effect: Stakeholders provide feedback, leading to practical standards.
Publishing draft regulations in the official gazette is driven by the statutory requirement for administrative transparency. This open publication allows all stakeholders, including small food businesses, consumer groups, and international trade partners, to submit feedback. Consequently, the final standards are refined based on practical realities, minimizing unintended compliance difficulties while maintaining high public safety levels.

31. (D) Proprietary Foods
Proprietary foods refer to articles of food that have not been explicitly standardized under existing food safety regulations. These products must still utilize permitted ingredients and additives within authorized limits. This categorization allows food business operators to innovate and introduce new product formulations to the market while ensuring basic microbiological and chemical safety parameters are strictly maintained.

32. (C) A is true but R is false.
While the actual field-level enforcement of the Food Safety and Standards Act is primarily executed by State and Union Territory administrations, the central authority is far more than an advisory body. FSSAI possesses direct central licensing capabilities, regulates imports at national ports, and issues binding statutory guidelines, making the reason statement false.

33. (B) Pharmaceutical drugs
Food safety standards systematically categorize consumable items, including dairy, confectionery, and cereals, to establish clear identity and quality parameters. Pharmaceutical drugs are specifically excluded from this food regulatory framework. Medicines are governed by distinct clinical protocols, manufacturing requirements, and quality standards managed separately under the Drugs and Cosmetics Act by the Central Drugs Standard Control Organization.

34. (D) Horizontal standards regulate overarching safety requirements like additives and contaminants across food categories.
Horizontal standards regulate safety parameters that apply broadly across multiple food categories, such as permissible limits for heavy metals, pesticide residues, and food additives. Conversely, vertical standards focus on specific identity, compositional, and quality requirements unique to a single product class, such as honey, milk, or olive oil, defining what constitutes that specific item.

35. (A) I, II, and III
The Designated Officer plays a crucial administrative role at the district level. Their statutory powers include issuing or cancelling

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different domains, making the reason a valid explanation of the assertion.

18. (D) Taxation and Tariff Rate Quotas for Food Items
Scientific Panels are established to evaluate scientific risks, human health impacts, and technological safety aspects of food production. Domains such as food additives, pesticides, and genetically modified organisms require rigorous scientific risk assessments. Taxation, customs tariffs, and trade import quotas are economic policies managed by the Ministry of Finance and Commerce, entirely outside FSSAI's scientific mandate.

19. (A) Draft standards are notified in the Gazette of India to invite public objections and suggestions.
The regulatory process for setting food safety standards is designed to be highly transparent and participatory. Draft standards are formally notified in the Gazette of India to invite feedback, objections, and constructive suggestions from stakeholders. This period of public consultation ensures that final regulations are practical, scientifically robust, and do not inadvertently cause unnecessary trade barriers.

20. (B) I → III → IV → II
The formulation of food standards follows a logical administrative progression. First, the relevant Scientific Panel prepares the draft standard based on risk assessment. The Food Authority then approves this draft, which is subsequently hosted for public consultation and international WTO-SPS notifications. After addressing feedback and refining the text, the final standard is published in the Gazette of India.

21. (A) Gazette Notification – Restricts standard application only to exports
Publication in the official Gazette of India is the mandatory legal step that makes a standard enforceable nationwide. It applies to all domestic food sales as well as imports, rather than restricting regulations to exported goods. The other bodies, such as Scientific Panels, Scientific Committees, and the Food Authority, operate correctly within their respective technical and administrative domains.

22. (D) A scientific risk assessment report provided by experts to guide decisions.
A scientific opinion represents an official, evidence-based document generated by the Scientific Committee or specialized Panels. It provides a comprehensive risk assessment concerning specific biological, chemical, or physical hazards in food. This technical report serves to guide policy decisions, standard formulations, and risk management strategies without containing legal charges, commercial marketing preferences, or general state directives.

23. (B) P-III, Q-I, R-II, S-IV
The standard-setting process moves systematically through distinct legal stages. The draft notification represents the initial publication of intent, which is followed by a public consultation phase for stakeholder feedback. The final gazette notification officially transforms the draft into a legally enforceable regulation, while the implementation grace period provides business operators with essential time to adapt.

24. (C) It comprises Scientific Panel Chairpersons and independent experts.
The Scientific Committee is strategically structured to ensure high-level scientific coordination. It is composed of the chairpersons of all the individual specialized Scientific Panels, alongside several independent scientific experts. This multi-disciplinary composition ensures that the committee can effectively integrate advice from diverse fields, resolve cross-panel conflicts, and deliver unified, robust scientific recommendations to the authority.

25. (D) Scientific Panel → Scientific Committee → Food Authority → Consultation → Final Gazette Notification
Establishing a maximum residue limit requires strict scientific and administrative review. The proposal initiates within the specialized Scientific Panel for risk evaluation. It then progresses to the Scientific Committee for coordination, followed by Food Authority approval. Next, the draft undergoes public consultation and international notification before culminating in the final, legally binding Gazette Notification publication.

26. (A) Both Statement I and Statement II are true.
As a member of the World Trade Organization, India is internationally obligated to notify draft sanitary and phytosanitary regulations to the

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132. Identify the incorrect statement regarding the limitations or capabilities of Food Safety on Wheels (FSW).
(A) They are fully equipped to conduct basic microbiological screening and detection of common adulterants.
(B) They serve as a platform for conducting awareness campaigns using audio-visual tools.
(C) Their reports hold the same statutory weight as a Referral Laboratory.
(D) They can be used by State Food Safety Officers to test surveillance samples in real-time.

133. Identify the correct pair regarding FSSAI training and rating schemes.
(A) Hygiene Rating – Voluntary certification for eateries to display safety standards
(B) RUCO (Repurpose Used Cooking Oil) – A training module exclusively for manufacturing synthetic engine oil
(C) Clean Street Food Hub – A mandate that requires street vendors to operate inside air-conditioned malls
(D) FoSTaC Advance Catering – A course designed specifically for primary agricultural farmers

134. An FSW unit arrives in a remote village. The accompanying FSO screens a sample of local milk and finds a strong positive result for urea adulteration using rapid kits. What is the case-based enforcement protocol the FSO should follow next?
(A) Order the immediate burning and complete physical destruction of the local suspect dairy farm.
(B) Immediately imprison the milk vendor based purely and exclusively on the rapid kit chemical result.
(C) Completely ignore the analytical result as FSW mobile kits are strictly meant only for public demonstration.
(D) Treat as preliminary finding, and draw a formal statutory sample for analysis.

135. What is the intended cause-and-effect of mandatory FoSTaC training for FBOs?
(A) Cause: Mandatory training fees generate massive central revenue; Effect: FSSAI quickly transitions into a highly profitable private corporation.
(B) Cause: Training builds self-compliance capacity; Effect: Reduces regulatory burden and foodborne illnesses.
(C) Cause: FBO employees extensively learn chemical synthesis; Effect: Rapid national increase in the deliberate use of unapproved toxic additives.
(D) Cause: Highly complicated and academic training curriculum; Effect: Immediate mass closure of micro-scale and local small food businesses.

136. Which digital system was launched by FSSAI specifically to simplify the testing process and improve the detection of adulteration at the household level?
(A) FLRS
(B) ICEGATE
(C) DART
(D) FICS

137. Directions: In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): FoSCoRIS is extensively utilized by Food Safety Officers in the field.
Reason (R): FoSCoRIS allows officers to conduct inspections using standardized digital checklists on mobile devices, ensuring uniformity and real-time data uploading.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

138. Which of the following is NOT a feature of the Indian Food Laboratory Network (INFoLNET)?
(A) Allowing consumers to directly modify the analytical test reports.
(B) Centralized management of laboratory networks.
(C) Tracking the entire lifecycle of a food sample from collection to test report generation.
(D) Integration of risk profiling and surveillance data.

139. Identify the correct statement regarding transparency and the Right to Information (RTI) in FSSAI operations.
(A) FSSAI is completely exempt from the Right to Information Act, 2005 due to national

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licenses for food businesses, prohibiting the sale of non-compliant food articles, and officially sanctioning or launching prosecutions for violations. However, the appointment of the Chief Executive Officer is an executive function reserved exclusively for the Central Government.

36. (C) Food Safety Officer – Appointed directly by the Central Government
Food Safety Officers are state-level field enforcement personnel. They are officially appointed by the respective State Governments or Union Territory administrations, rather than directly by the Central Government. The other administrative roles, including the Commissioner of Food Safety, Designated Officers, and Adjudicating Officers, are correctly paired with their statutory ranks and appointing authorities within the state.

37. (A) Food without specific standards but containing permitted ingredients and additives.
Proprietary food is defined as an article of food that lacks specific standardized identity or compositional regulations under the parent Act. However, such products must be manufactured using only permitted ingredients, nutrients, and food additives within regulated safety limits. This definition provides regulatory flexibility for food product innovation while ensuring strict chemical and microbiological safety.

38. (D) P-III, Q-IV, R-II, S-I
The Commissioner of Food Safety oversees the entire implementation of the Act within a state. The Designated Officer manages district operations and sanctions prosecutions. The Food Safety Officer acts as the field representative, drawing samples and inspecting food premises. The Adjudicating Officer is a district-level magistrate who conducts hearings and imposes civil penalties for non-compliance.

39. (B) Operational criteria like turnover, capacity, and multi-state presence.
The division between central and state licensing jurisdictions is determined by clear operational thresholds. These criteria include annual financial turnover, daily production capacity, and multi-state operational presence. Large-scale manufacturers, importers, and businesses operating across multiple states must obtain a Central License, while smaller localized businesses operate under State Licenses or basic local registrations.

40. (C) The FSO reports the non-compliance to the Central Licensing Authority.
When a local Food Safety Officer identifies severe hygiene violations at a facility operating under a Central License, they cannot unilaterally cancel or suspend that license. The correct administrative protocol requires the officer to document the inspection findings and officially report the non-compliance to the Central Licensing Authority, which holds the legal power to take action.

41. (A) 2, 3, 1
The statutory enforcement hierarchy within a state flows systematically from the highest executive down to the field-level inspecting officers. The Commissioner of Food Safety holds the supreme administrative authority for the state. Below them, the Designated Officer manages specific district-level operations. The Food Safety Officer operates as the field officer, carrying out inspections and sampling.

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42. (A) They can sentence an offender to life imprisonment.
Adjudicating Officers are administrative magistrates, typically of the rank of Additional District Magistrate, who possess civil court powers to hear cases and impose financial penalties for non-criminal food safety violations. They do not have the statutory authority to sentence individuals to imprisonment. Criminal prosecutions involving jail terms are referred exclusively to Special Judicial Courts.

43. (B) Contaminants limits – Horizontal standards applying broadly across food categories
Contaminants and toxins limits represent horizontal standards because they apply across all food groups to protect public health. Conversely, standards for specific items, like infant milk substitutes, are vertical standards because they define precise compositional requirements for a single product category. Permitted food colors are also horizontal regulations, while microbiological standards apply to diverse categories.

44. (B) Railways fall under the jurisdiction of Central FSSAI Designated Officers for railways.
Under the statutory framework of the Act, major national establishments like the Indian Railways and defense bases have a dedicated administrative

disclosure.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true, but Statement II is false.
(D) Statement I is false, but Statement II is true.

147. Identify the incorrect statement regarding the FSSAI Annual Report.
(A) Copies of the report are strictly prohibited from public release.
(B) The Authority is required to prepare an annual report summarizing its activities during the previous year.
(C) The Central Government must lay the annual report before both Houses of Parliament.
(D) State Governments must lay the corresponding state performance reports before the State Legislature.

148. Identify the correct pair connecting a digital portal to its primary target user base.
(A) FoSTaC – Consumers looking for cooking recipes
(B) FICS – Domestic farmers tracking weather conditions
(C) FoSCoS – FBOs applying for compliance
(D) ICEGATE – FSSAI laboratory technicians entering sample data

149. An FSO is conducting a routine hygiene inspection of a restaurant using the FoSCoRIS mobile app. They encounter a severe structural violation. How does the digital system handle this case?
(A) The app captures photos, logs GPS, and issues a digital improvement notice.
(B) The app automatically and permanently deletes the restaurant's central license without any human intervention.
(C) The app strictly forces the inspecting FSO to print a physical paper copy using a local wireless mobile printer.
(D) The app directly translates the noted physical violation into a public star consumer hygiene rating algorithm.

150. What is the cause-and-effect relationship resulting from the digitization of inspection reports via FoSCoRIS?
(A) Cause: Introduction of highly complex computer programming and coding languages for senior FSOs; Effect: Complete and permanent national halt of all field inspections.
(B) Cause: Complete decentralized physical distribution of database servers across state departments; Effect: Immediate loss of historical enforcement and penalty data.
(C) Cause: Elimination of all commercial mobile cellular networks in municipal areas; Effect: Switching back to manual postal mail service for sending safety compliance reports.
(D) Cause: Replacing paper sheets with digital checklists; Effect: Prevents back-dated reporting, ensuring transparent enforcement.

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54. (D) To identify emerging safety risks and assess compliance trends.
The primary goal of routine market surveillance programs is to map compliance trends and identify emerging biological or chemical safety risks. These programs focus on gathering data to safeguard public health and target enforcement resources effectively, rather than penalizing micro-scale street vendors or generating administrative revenue through excessive fines.

55. (B) Issue a temporary order to seize the oil or prohibit its sale.
When a Food Safety Officer strongly suspects that a food item poses an immediate public health hazard, they must act swiftly to protect consumers. Rather than waiting for final laboratory confirmation, the officer is empowered to issue a temporary seizure order or prohibit its sale. This preventive measure stops the potentially toxic product from reaching consumers.

56. (A) Both Statement I and Statement II are true.
An Improvement Notice is a constructive regulatory tool used by Food Safety Officers to address minor hygiene non-compliances. It provides the business operator with a clear, reasonable timeframe to rectify the observed defects. If the operator fails to take corrective action, the Designated Officer holds the statutory authority to suspend their license to ensure public safety.

57. (D) An FSO has power to permanently cancel any license unilaterally.
Food Safety Officers possess broad inspecting powers, including entering manufacturing facilities, seizing adulterants, and breaking open locked packages containing suspected food. However, they do not have the statutory power to permanently cancel or suspend a food business license. That legal authority is reserved exclusively for the Designated Officer or the state Commissioner of Food Safety.

58. (A) Total Diet Study – Assessing background chemical exposure of populations via food
A Total Diet Study is a recognized surveillance methodology used to assess dietary exposure to chemical contaminants across a population. Rapid Analytical Food Testing is designed for screening rather than issuing formal import certificates. Food Safety on Wheels serves as a mobile laboratory for rapid screening and awareness, not for executing arrests.

59. (B) The FSO is authorized to search the vehicle and seize the food, breaking the cargo hold if needed.
Under the statutory provisions of the Act, a Food Safety Officer is authorized to inspect any vehicle transporting food articles at any reasonable time, including midnight. If the driver or operator refuses to cooperate, the officer has the legal power to search the vehicle, break open the cargo hold if necessary, and seize suspected food.

60. (B) Cause: Minor defect; Effect: Allows FBO to correct issues, promoting compliance over penalization.
Utilizing an Improvement Notice for minor hygiene defects is driven by a regulatory philosophy of progressive compliance. Instead of immediately penalizing small operators for non-critical issues, this notice provides them with a structured opportunity to correct the defects. This approach fosters cooperation, improves food safety standards, and reduces unnecessary legal burdens on the judicial system.

61. (A) ISO 17025
To achieve official NABL accreditation, a primary food testing laboratory must comply with the international standard ISO/IEC 17025. This standard specifies the general requirements for the competence, impartiality, and consistent operation of testing and calibration laboratories. It ensures that the laboratory's analytical methods, equipment calibration, and staff expertise meet rigorous global criteria.

62. (A) Both A and R are true and R is the correct explanation of A.
The Referral Food Laboratory functions as the designated appellate laboratory within the national testing ecosystem. When a food business operator officially disputes the analytical findings of a Primary Food Laboratory, they can request an appeal. The counterpart sample is then sent to the Referral Laboratory, whose independent, highly validated results are legally final and binding.

63. (D) NFL, Srinagar
FSSAI operates several advanced National Food Laboratories as centers of excellence, including those located in Ghaziabad, Kolkata, and JNPT

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facilitating faster processing times and consistent enforcement nationwide.

121. (D) Food Safety Training and Certification
FoSTaC stands for Food Safety Training and Certification. This initiative was launched by FSSAI to build capacity and raise food safety awareness among food handlers. The program offers diverse training courses tailored to different sectors of the food industry, ensuring that personnel understand hygiene practices and comply with regulatory standards.

122. (A) Both A and R are true and R is the correct explanation of A.
Food businesses must employ at least one certified Food Safety Supervisor under the FoSTaC program. This requirement ensures that a trained individual is on-site to oversee daily operations. The supervisor is responsible for implementing Good Manufacturing Practices and Good Hygiene Practices, making the reason a valid explanation of the assertion.

123. (B) Enforcement
The Food Safety Mitra scheme includes Digital Mitras, Trainer Mitras, and Hygiene Mitras, who facilitate compliance, training, and hygiene audits. Enforcement is a statutory regulatory function reserved exclusively for government officers, such as Food Safety Officers and Designated Officers, and is not a category under the private professional Mitra scheme.

124. (B) FSW are mobile labs deployed for rapid surveillance, awareness, and training.
Food Safety on Wheels refers to mobile testing laboratories equipped to conduct rapid safety screening and public awareness campaigns. These units travel to local markets and remote areas to test food samples for common adulterants. They do not operate as judicial courts or possess the advanced equipment required for complex pesticide residue analysis.

125. (A) I, II, and IV
Digital Mitras are professionals trained to assist food businesses with online compliance. Their roles include helping operators file license applications, submit annual returns, and process license modifications or renewals through the FoSCoS portal. They do not possess enforcement or police powers to arrest individuals, as that remains a state-level statutory function.

126. (C) Penalty Mitra – Collects cash fines from FBOs
There is no such category as a Penalty Mitra under the Food Safety Mitra scheme. Collecting penalties and enforcing compliance are statutory functions managed by official Adjudicating Officers and state authorities. The other roles, including Hygiene Mitras, Digital Mitras, and Trainer Mitras, are correctly defined as private professionals who assist businesses with compliance.

127. (D) Empowering consumers with RAFT kits and using mobile labs for rapid screening.
The core concept behind Anytime Anywhere Testing is to decentralize food safety monitoring by empowering the public. This initiative utilizes mobile testing laboratories, such as Food Safety on Wheels, and Rapid Analytical Food Testing kits to enable rapid screening. It allows consumers and local officers to quickly check food quality without relying solely on static laboratories.

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128. (C) P-II, Q-III, R-I
FoSTaC courses are designed for different levels of the food industry. Basic level courses target micro-scale businesses and street food vendors. Advance level courses are tailored for state or centrally licensed manufacturers and catering services. Special level courses focus on high-risk sectors, including dairy, meat, and edible oil processing units.

129. (B) To create trained professionals who facilitate compliance and hygiene at the grassroots level.
The primary objective of the Food Safety Mitra program is to create a network of trained professionals who facilitate compliance. These professionals assist food businesses with licensing, training, and hygiene audits, helping to build capacity at the grassroots level. This initiative supports rather than replaces the statutory role of official enforcement officers.

130. (D) Clean Street Food Hub, Digital Mitra, and Basic FoSTaC.
For a local street food vendor with limited digital literacy, the authority provides targeted support programs. The Clean Street Food Hub initiative improves hygiene in local markets, while Digital Mitras assist with licensing paperwork. Basic FoSTaC training provides practical food hygiene education, helping the vendor comply with standards without needing advanced technical knowledge.

screening tools provide faster, non-statutory presumptive results.

73. (D) Aflatoxin limits – Evaluated using HPLC or LC-MS/MS
Aflatoxins are highly toxic, naturally occurring carcinogenic mycotoxins that require sensitive detection methods. Consequently, laboratories utilize advanced chromatographic techniques like High-Performance Liquid Chromatography or Liquid Chromatography-Mass Spectrometry to analyze them. Other parameters, such as total plate count or heavy metals, require specific microbiological media and atomic absorption spectrophotometry rather than simple visual inspection.

74. (A) The Referral Lab's report supersedes the Primary report and is final.
In the event of conflicting analytical findings between different testing facilities, the statutory framework of the Act provides a clear resolution hierarchy. The Referral Food Laboratory functions as the supreme appellate laboratory under Section 46. Therefore, its analytical findings automatically supersede the primary laboratory's report, serving as the final, legally binding scientific evidence.

75. (B) Cause: Manual lab reporting; Effect: Centralized portal ensuring real-time data integration and transparency.
The historical reliance on manual, paper-based laboratory reporting often led to administrative delays and data fragmentation. To resolve this, the authority implemented the Indian Food Laboratory Network. This digital platform centralizes lab workflows, enabling real-time data integration, sample tracking, and enhanced transparency across the national network of notified, state, and referral food testing laboratories.

76. (B) Single Window Interface for Facilitating Trade
In the import clearance system, SWIFT stands for Single Window Interface for Facilitating Trade. This digital initiative, integrated with customs, allows importers to submit all required documents and clearance requests through a single online portal. It streamlines the regulatory workflow, facilitates seamless coordination between customs and food safety authorities, and significantly reduces clearance times.

77. (A) Both A and R are true and R is the correct explanation of A.
Under national trade regulations, all commercial food consignments entering the country must obtain a No Objection Certificate from the food authority. The Food Import Clearance System was designed to manage this process, verifying that imported products meet domestic safety standards through document scrutiny and testing. Both statements are true, and the reason directly explains the assertion.

78. (C) Food articles imported strictly for personal consumption.
Commercial food imports are subject to rigorous safety checks, visual inspections, and mandatory laboratory analysis. However, food articles imported strictly for personal consumption are generally exempt from this commercial clearance process. These non-commercial personal consignments must still comply with basic baggage limits and safety declarations, but do not require formal FSSAI licensing or import clearance.

79. (D) The RMS flags specific consignments for sampling based on risk profiles.
The Risk Management System is a data-driven tool designed to streamline customs clearance. Rather than mandating testing for every single consignment, the system utilizes risk profiling to identify high-risk shipments for physical inspection and laboratory sampling. This approach optimizes testing resources, accelerates the clearance of compliant low-risk foods, and maintains strict border safety controls.

80. (C) I, II, and III
The import clearance process at ports of entry involves several critical quality checks. Authorized Officers perform pre-arrival document scrutiny, conduct detailed visual inspections of the cargo, and draw representative samples for laboratory testing. However, fixing the domestic retail price of food products is an economic business decision, completely outside the scope of food safety officers.

81. (B) FIRA – Issued to clear perishable goods
A Food Import Rejection Alert is a critical safety notice issued to prevent the entry of non-compliant or hazardous food consignments. It is not used to clear perishable goods. Other components, such as Non-Conformance Reports, No Objection Certificates, and database-driven

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product tracking, operate correctly within the import control module to monitor global food shipments.

82. (D) Checking documents like the Bill of Entry and country of origin certificate before inspection.
Pre-arrival document scrutiny represents the initial administrative phase of the import clearance process. The Authorized Officer carefully reviews essential trade documents, such as the Bill of Entry, country of origin certificate, and health declarations, before conducting physical inspections. This step verifies that the incoming shipment is legally registered and complies with import documentation requirements.

83. (A) P-II, Q-III, R-IV, S-I
ICEGATE serves as the primary customs portal integrated with the food authority's systems. FICS is the dedicated digital module for managing food import clearances. The Authorized Officer is the official appointed by FSSAI to manage clearances at ports. Visual inspection represents the physical examination of cargo for labeling compliance and structural integrity.

84. (C) To inform authorities that a consignment poses a safety risk, thereby preventing its entry.
The primary purpose of issuing a Food Import Rejection Alert is to block hazardous food products from entering the country. When a consignment fails safety testing, this alert is generated to notify port authorities, preventing its entry and ensuring that the non-compliant cargo is either exported back or safely destroyed under regulatory supervision.

85. (A) Reject because regulations require 60% of shelf life remaining at clearance.
To ensure that imported food products remain safe and of high quality for domestic consumers, regulations establish minimum shelf-life requirements. Importers must ensure that a consignment has at least sixty percent of its original shelf life remaining at the time of customs clearance. Consignments failing this threshold are systematically rejected by the Authorized Officer.

86. (C) Statement I is true, but Statement II is false.
Under import regulations, certain minor labeling deficiencies, such as a missing FSSAI logo or importer details, are classified as rectifiable and can be corrected in a customs bonded warehouse. However, major compositional information, such as a completely missing ingredient list, is considered a non-rectifiable defect, making the second statement false.

87. (B) Samples drawn by the Authorized Officer are sent exclusively to foreign laboratories.
Samples collected from imported consignments by the Authorized Officer are sent exclusively to FSSAI-notified domestic laboratories or referral laboratories within India, rather than foreign facilities. The laboratories communicate test results digitally via the FICS portal, and importers retain the right to request a re-test at an appellate referral laboratory if a sample fails.

88. (C) CBIC – The nodal authority operating ICEGATE, integrated with FICS
The Central Board of Indirect Taxes and Customs is the nodal national authority operating the ICEGATE portal. This system is integrated with FICS to facilitate trade. Other documents, such as the Bill of Entry, are filed by the importer rather than generated by food safety laboratories, and risk systems speed up rather than block compliant exports.

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89. (D) A designated Referral Food Laboratory.
When an imported consignment, such as almonds, is rejected by a primary laboratory for exceeding safety limits, the importer has the right to appeal. The counterpart sample must be sent to a designated Referral Food Laboratory for highly validated analysis. The findings of this appellate laboratory are legally binding and determine whether the cargo is cleared or rejected.

90. (A) Cause: Risk-based data analytics; Effect: Faster clearance of low-risk goods while targeting high-risk imports.
Integrating the clearance module with the Customs Risk Management System is driven by a need for efficient border controls. By utilizing risk-based data analytics, the system identifies high-risk consignments for detailed sampling while allowing compliant, low-risk food products to proceed quickly. This integration facilitates international trade while maintaining food safety standards.

91. (B) Once or twice a year based on risk
High-risk food businesses, such as dairy or meat processing units, are required to undergo structured Third-Party Audits to verify compliance. Depending on the specific risk

category and past performance of the business, these audits are typically conducted once or twice a year. This regular oversight ensures continuous adherence to hygiene standards and mitigates public health risks.

92. (A) Both A and R are true and R is the correct explanation of A.
Proprietary foods do not require prior product approval if they utilize permitted ingredients and additives within regulated limits. This approval process is reserved for novel foods, non-specified ingredients, and substances with no history of safe consumption in India. Both statements are true, and the reason explains why proprietary foods are exempt from this process.

93. (A) Standardized cow milk
Standardized food products, such as cow milk, have established vertical standards and do not require prior product approval before manufacturing or sale. This approval pathway is reserved for novel, non-specified foods, or products containing innovative ingredients with no history of safe use in the country, such as insect proteins or unlisted botanical extracts.

94. (C) They conduct objective assessments of FBOs' FSMS compliance.
FSSAI-empanelled Third-Party Auditing agencies are independent organizations authorized to conduct objective assessments of food businesses. They evaluate compliance with Food Safety Management Systems, including hygiene practices and process controls. These agencies do not possess police powers to make arrests, nor do they formulate national standards, which remains a statutory function of the food authority.

95. (D) I, II, and IV
Novel foods are defined by specific criteria under safety regulations. These include foods with no history of human consumption in India, ingredients produced using genetic modification, or foods manufactured through new processes that alter their nutritional value. Traditional regional recipes with a history of safe use are excluded from the novel food category.

96. (C) Audit Report – Document granting automatic immunity from FSSAI inspections
An audit report from an empanelled agency documents a facility's compliance with safety systems. However, a satisfactory report does not grant the business immunity from routine inspections by state Food Safety Officers. Other pairs, such as empanelled agencies, FSMS audits, and corrective action plans, are correctly described within the voluntary and mandatory auditing framework.

97. (B) Food for Special Medical Purposes
Under the regulatory framework for non-specified foods and health supplements, FSMP stands for Food for Special Medical Purposes. These are specially formulated and processed products intended for the dietary management of patients with specific diseases, disorders, or medical conditions. Their composition is strictly regulated to ensure safety and therapeutic efficacy under medical supervision.

98. (D) P-IV, Q-I, R-II, S-III
Novel foods lack a history of safe human consumption in the country. Proprietary foods use standardized ingredients but lack specific vertical compositional regulations. Health supplements are intended to supplement the diet with concentrated nutrients, while Food for Special Medical Purposes is formulated for patients suffering from specific diseases under medical supervision.

99. (A) They may face less frequent routine inspections by state officers.
Successfully undergoing a recognized Third-Party Audit provides operational advantages for a food business. Because the audit verifies robust safety management systems, the authority may reduce the frequency of routine inspections by state officers. This risk-based approach optimizes regulatory resources while encouraging businesses to maintain high hygiene and safety compliance standards.

100. (C) Apply for non-specified product approval by submitting a safety dossier.
When introducing a product containing an unlisted synthetic amino acid, the manufacturer must follow the non-specified product approval pathway. This process requires submitting a comprehensive safety dossier containing toxicological data, clinical studies, and nutritional evaluations. The product cannot be launched as a standard proprietary food until the Scientific Panel officially approves its safety.

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Nhava Sheva. However, Srinagar does not host an active, central National Food Laboratory under direct FSSAI management. Regional testing in that territory is supported by state-level food testing laboratories or other notified laboratories.

64. (C) Private labs can be recognized if they have NABL accreditation.
FSSAI recognizes both public and private testing laboratories to ensure a robust national analytical network. Private laboratories are eligible for official notification and recognition provided they possess active NABL accreditation. This requirement ensures that all recognized facilities, regardless of ownership, maintain uniform technical competence, equipment standards, and reliable reporting protocols.

65. (B) I, II, and IV
The primary functions of a Referral Food Laboratory include analyzing appeal samples sent by Designated Officers, conducting scientific investigations to support standard-setting, and organizing inter-laboratory proficiency testing. These laboratories do not possess any administrative authority to issue food licenses. Licensing is an executive function managed exclusively through the digital FoSCoS portal by Designated Officers.

66. (D) Primary Food Laboratory – Authorized only to test cosmetics and pharmaceuticals
Primary Food Laboratories are officially notified under the Act to test statutory and surveillance food samples collected by enforcement officers. They are not limited to testing cosmetics or pharmaceuticals, which fall under the mandate of drug control laboratories. The other classifications, including National, State, and Referral laboratories, are correctly described within the ecosystem.

67. (A) A qualified person appointed by the Commissioner or FSSAI to analyze food.
A Food Analyst is a technically qualified professional officially appointed by the Commissioner of Food Safety or the central authority. To hold this statutory position, the individual must possess the prescribed educational background and successfully pass the National Food Analyst Examination. They are legally authorized to analyze food samples and issue official analytical certificates.

68. (C) P-II, Q-IV, R-III, S-I
Primary Notified Laboratories handle the initial analysis of statutory samples. Referral Laboratories act as the appellate bodies for resolving disputes regarding primary results. National Food Laboratories serve as apex institutions and centers of excellence. Food Safety on Wheels operates as a mobile testing unit, providing rapid screening and public awareness in remote areas.

69. (A) To ensure testing competence, reliable results, and traceability.
Mandating NABL accreditation for all notified laboratories ensures that the analytical testing ecosystem operates with high competence. This structured accreditation verifies that laboratories utilize validated testing methods, calibrated analytical equipment, and qualified scientific personnel. Consequently, this system guarantees that analytical reports are highly reliable, traceably documented, and legally defensible in court proceedings.

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70. (D) The FBO can appeal to the Designated Officer to send the sample to the Referral Lab.
When a food business operator officially disputes an adverse analytical report from a primary laboratory, the Act provides a clear statutory remedy. The operator can file a formal appeal with the Designated Officer. Upon receiving the appeal, the officer is required to dispatch the counterpart backup sample to a designated Referral Food Laboratory for final analysis.

71. (A) 2, 1, 4, 3, 5
The statutory appeal process follows a strict sequential flow. The process begins when the Food Safety Officer lifts a sample and dispatches it to the Primary Notified Laboratory. If the analyst issues an adverse report, the operator files an appeal. The Designated Officer then forwards the counterpart sample to the Referral Laboratory, which issues the final report.

72. (C) The Referral Laboratory is given an infinite amount of time to analyze appeal samples.
Under the statutory framework, all laboratories must operate within designated timelines to ensure swift justice and market stability. While a Primary Food Analyst is generally required to complete analysis within fourteen days, Referral Laboratories are also bound by strict, non-infinite timelines to deliver their binding reports. Rapid

111. (D) Class III Recall – Situations involving critical biological hazards leading to immediate outbreaks.
Class III recalls involve minor violations, such as labeling defects, that do not pose a significant safety risk. Critical biological hazards that cause serious health consequences or death are classified as Class I recalls. The other categories, including Class I, Class II, and Mock recalls, are correctly paired with their definitions under the regulations.

112. (C) Removing food from the market due to safety risks or non-compliance.
A food recall is defined as an action taken to remove food products from the distribution chain because they pose a safety risk or violate food safety regulations. This process can be initiated voluntarily by the food business operator or mandated by the regulatory authority to protect public health and prevent consumer exposure to hazards.

113. (B) P-II, Q-I, R-IV, S-III
Recalls are classified based on the severity of the hazard. Botulinum toxin in canned food is a life-threatening hazard, triggering a Class I recall. An incorrect nutritional label without safety risks represents a Class III recall. A mild allergen triggers a Class II recall, while a simulated traceability test is classified as a Mock recall.

114. (D) Coordinating multi-state actions, communicating risk, and issuing central directives.
During a nationwide food safety crisis, the central authority is responsible for coordinating multi-state actions. Its primary duties include communicating risk to the public, issuing emergency directives, and working with state commissioners to ensure consistent enforcement. These actions protect consumers and prevent the spread of foodborne illnesses without shutting down compliant businesses.

115. (A) Initiate a recall, halt distribution, and inform the State Authority.
When a food business discovers that a product contains an undeclared allergen like peanuts, they must act immediately to protect consumers. The operator is required to halt further distribution, initiate a product recall, and notify the state food safety authority. This prompt action prevents severe allergic reactions and ensures regulatory compliance.

116. (C) Statement I is true, but Statement II is false.
The Food Safety Compliance System was developed to provide a unified, cloud-based platform for licensing and registration across India. However, the system allows minor modifications, such as address changes or product additions, through designated modification modules. Operators are not required to apply for a brand new license for every small change, making the second statement false.

117. (A) Destroy the product without notifying the Designated Officer.
During a product recall, the food business operator must follow strict disposal protocols. They cannot destroy the retrieved products without notifying the Designated Officer, who must supervise the disposal process to ensure safety. The operator is also responsible for identifying the distribution extent, issuing public warnings, and submitting progress reports to the authority.

118. (D) FLRS – Allowed arbitrary typing of non-standardized product names
The legacy FLRS portal allowed users to type non-standardized product names, which led to inconsistencies and delays. To resolve this, FoSCoS introduced a standardized product approach. The other options are incorrect, as FoSCoS is available in multiple regional languages, the standardized approach applies broadly, and the endorsement module is used to modify licensing details.

119. (B) Submit a final report detailing root cause, volume recovered, and CAPA.
To officially close a product recall, the food business operator must submit a comprehensive final report to the authority. This report must detail the root cause of the contamination, the volume of product recovered, and the corrective and preventive actions implemented to prevent recurrence. This documentation verifies that the safety hazard has been resolved.

120. (C) Cause: Unstructured FLRS text entries; Effect: Standardized menus enable streamlined license approvals.
The use of unstructured text entries in the legacy FLRS portal often caused administrative delays and inconsistent licensing. By replacing free-text entry with standardized menus in FoSCoS, the authority streamlined the application process. This standardized approach ensures that licenses are issued only for approved categories,

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to safeguard the intellectual property of food businesses.

141. (A) DART – Online portal for FBOs to pay their corporate income tax
DART is a consumer-focused manual for detecting food adulteration using simple rapid tests, rather than an online tax payment portal. Corporate income tax is managed by the Income Tax Department through separate financial platforms. The other portals, including FoSCoS, FoSCoRIS, and INFoLNET, are correctly paired with their respective operational compliance functions.

142. (C) An application replacing manual inspections with digital checklists for FSOs.
FoSCoRIS is a specialized digital application designed to modernize the inspection process. It replaces manual, paper-based inspection sheets with standardized digital checklists that Food Safety Officers complete on mobile devices during field audits. This system ensures consistent enforcement, enables real-time reporting, and improves data transparency across state and national levels.

143. (D) P-III, Q-I, R-IV, S-II
INFoLNET operates as the laboratory information management system for food testing facilities. FICS is the digital import clearance system integrated with customs. FoSCoRIS serves as the tablet-based inspection tool for field officers, while the DART booklet provides quick, home-based testing methods to help consumers detect common adulterants.

144. (C) It empowers consumers to perform simple, home-based tests to detect common adulterants.
The DART manual serves to bridge the gap between laboratories and households. By detailing simple testing methods that use common household reagents, the guide empowers consumers to check food quality at home. This educational tool raises public awareness about food adulteration, encourages active participation in food safety, and helps protect families from health hazards.

145. (B) Use iodine tincture; blue color indicates starch.
To test for starch adulteration in milk at home, a consumer can use a simple chemical test. Adding a few drops of iodine tincture to a milk sample will produce a blue color if starch is present. This rapid screening test provides immediate, presumptive results without requiring advanced laboratory training or complex equipment.

146. (A) Both Statement I and Statement II are true.
The authority maintains transparency by publishing minutes of scientific panel meetings and draft standards for public review on its website. This practice encourages public trust and stakeholder participation. However, to protect intellectual property, confidential commercial information, such as proprietary formulations submitted for product approval, is safeguarded from public disclosure. Both statements are true.

147. (A) Copies of the report are strictly prohibited from public release.
The FSSAI Annual Report is a public document designed to ensure regulatory accountability. It is not restricted from public release; instead, copies are laid before both Houses of Parliament and published on the official website. This open publication allows researchers, industry representatives, and the general public to evaluate national food safety performance.

148. (C) FoSCoS – FBOs applying for compliance
FoSCoS is the primary digital compliance portal utilized by food business operators to apply for licenses, registrations, and modifications. Other options are incorrect, as FoSTaC is a training portal rather than a recipe guide, FICS manages import clearances rather than domestic farming, and ICEGATE is the customs portal rather than a laboratory database.

149. (A) The app captures photos, logs GPS, and issues a digital improvement notice.
When an officer identifies a violation during a FoSCoRIS inspection, the application provides a structured response. It allows the officer to capture photographs of the non-compliance, log the precise GPS coordinates of the facility, and issue a digital improvement notice. This documentation ensures an objective, traceable record of the enforcement action.

150. (D) Cause: Replacing paper sheets with digital checklists; Effect: Prevents back-dated reporting, ensuring transparent enforcement.
Replacing paper-based inspection sheets with digital checklists on mobile devices has modernized enforcement operations. Because reports must be completed and uploaded on-

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131. (A) 3, 1, 2, 4
The deployment of a mobile testing unit follows a planned sequence. First, state authorities design the monthly route map for the unit. The mobile lab then travels to the designated local market or remote village. On-site, technicians conduct rapid testing of samples brought by consumers, and the aggregated data is uploaded for surveillance.

132. (C) Their reports hold the same statutory weight as a Referral Laboratory.
Food Safety on Wheels units are designed for rapid screening and public awareness. Their testing reports serve as preliminary screening results and do not hold the same statutory weight as official reports issued by notified Referral Laboratories. If a sample fails a rapid test, a formal statutory sample must be drawn for validated laboratory analysis.

133. (A) Hygiene Rating – Voluntary certification for eateries to display safety standards
The Hygiene Rating scheme is a voluntary certification program that allows food service establishments to display their hygiene standards to consumers. Other options are incorrect, as RUCO focuses on converting used cooking oil into biodiesel, and Clean Street Food Hubs upgrade existing street food clusters rather than relocating vendors into shopping malls.

134. (D) Treat as preliminary finding, and draw a formal statutory sample for analysis.
When a rapid mobile test indicates that milk is contaminated with urea, the officer cannot take immediate penal action. The rapid result must be treated as a preliminary finding. To initiate legal action, the Food Safety Officer must draw a formal statutory sample and send it to a notified laboratory for validated analysis.

135. (B) Cause: Training builds self-compliance capacity; Effect: Reduces regulatory burden and foodborne illnesses.
Mandating food safety training for business employees is designed to build self-compliance capacity. When food handlers understand correct hygiene and safety practices, the risk of contamination decreases. Consequently, this capacity-building reduces the regulatory burden on inspectors and leads to a decline in foodborne illnesses, improving public health outcomes across the country.

136. (C) DART
The Detect Adulteration with Rapid Test manual was developed to simplify the testing process for consumers. This resource provides instructions on how to conduct simple, home-based chemical and physical tests to detect common adulterants in daily food items. It empowers households to monitor food quality without requiring advanced laboratory equipment.

137. (A) Both A and R are true and R is the correct explanation of A.
The FoSCoRIS mobile application is widely utilized by Food Safety Officers during field inspections. This digital platform allows officers to complete standardized checklists on-site and upload inspection reports in real-time. By removing manual paperwork and capturing GPS-tagged data, the system ensures transparency and uniformity, making the reason a valid explanation of the assertion.

138. (A) Allowing consumers to directly modify the analytical test reports.
INFoLNET is a laboratory information management system designed to connect testing facilities across the country. Its features include sample tracking, centralized data management, and the integration of surveillance data. Consumers are not authorized to directly modify official analytical test reports, as these documents must remain secure and unaltered to preserve legal and scientific validity.

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139. (B) FSSAI has an RTI cell with CPIOs to handle queries from citizens.
FSSAI operates in compliance with national transparency laws, maintaining a dedicated Right to Information cell. This cell is staffed with Central Public Information Officers to address queries from citizens regarding food safety regulations and administrative activities. The authority is subject to the standard provisions of the Right to Information Act, 2005.

140. (B) I, II, and IV
The FSSAI Annual Report provides a public summary of the authority's operations during the year. It includes data on licensing registrations, enforcement activities, prosecutions, and financial audit reports. The report does not publish confidential commercial information, such as proprietary recipes, which are legally protected

101. (B) 3, 1, 2, 4
The product approval process follows a structured sequence. The food business first prepares and submits the safety data and detailed application. The operator then completes the payment and officially submits the application via the digital portal. Next, the relevant Scientific Panel reviews the scientific dossier, culminating in the final approval or rejection by the Food Authority.

102. (D) A TPA strips the Food Safety Officer of their right to inspect.
While third-party audits verify compliance and can lead to reduced inspection frequencies, they do not strip Food Safety Officers of their statutory right to inspect any food business. FSOs retain full legal authority to enter premises, take samples, and conduct inspections at any time, ensuring that public health oversight is maintained.

103. (B) Safety Dossier – Contains toxicity and clinical studies
A safety dossier is a technical document submitted by an applicant containing toxicity data, clinical studies, and risk assessments to prove product safety. Other options are incorrect, as the Scientific Committee consists of independent academic experts rather than industry CEOs, fees are paid to the authority, and post-market surveillance is monitored by the regulator.

104. (C) The auditor immediately alerts FSSAI and the FBO of the public health risk.
When a third-party auditor identifies a critical non-conformity that poses an immediate public health risk, they must follow strict reporting protocols. The auditor is required to immediately notify both the food business operator and the regulatory authority. This prompt notification enables swift corrective action and administrative intervention to prevent contaminated products from entering commerce.

105. (D) Cause: Safety risks of unknown ingredients; Effect: Mandatory scientific assessment before market access to protect consumers.
The requirement for novel food approval is driven by the potential safety risks of unknown ingredients. Because these substances lack a history of safe human consumption, a mandatory scientific assessment is required before they can be sold. This preventive process ensures that any new food product is safe for consumers, preventing foodborne illnesses.

106. (A) 2020
FSSAI officially launched the Food Safety Compliance System in the year 2020. This modern, cloud-based platform replaced the legacy Food Licensing and Registration System. The launch of this unified portal streamlined the licensing process, introduced a standardized product-based approach, and enhanced the overall efficiency of regulatory compliance for food businesses across India.

107. (A) Both A and R are true and R is the correct explanation of A.
Food safety regulations require all licensed food businesses to maintain an operational recall plan. This plan establishes the procedures for retrieving non-compliant or hazardous food from the distribution chain. By enabling rapid product retrieval, the recall plan minimizes public health risks during a safety crisis, making the reason a valid explanation of the assertion.

108. (B) Arresting the retail shop owners who sold the product.
The food recall process managed by a business operator includes identifying the hazard, halting distribution, notifying the regulatory authority, and retrieving and disposing of the affected product. Arresting retail shop owners is a criminal law enforcement action that falls under the jurisdiction of the police or judicial authorities, not the private food business.

109. (A) Sharing timely and accurate risk info with the public to prevent undue alarm.
During a food safety incident, crisis communication must be managed to protect public health. Sharing timely, accurate risk information helps prevent undue public alarm while instructing consumers on how to avoid the affected product. Communication should not be delayed indefinitely, and the central authority plays a key role in coordinating these messages across states.

110. (C) I, II, and IV
The Food Safety Compliance System includes several advanced digital features. It introduces a standardized product-based licensing approach, integrates online payment gateways, and links with mobile inspection tools like FoSCoRIS. It does not contain a module for generating automatic import clearances without mandatory laboratory testing, as import controls require physical inspection and analysis.

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site, the system prevents back-dated reporting and arbitrary manual modifications. This change ensures that inspections are transparent, reports are reliable, and compliance data is integrated into the national system.

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(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

15. Identify the incorrect statement regarding the +F logo and its significance.
(A) It assures consumers that the food product contains added micronutrients.
(B) Food Business Operators (FBOs) must strictly comply with FSSAI fortification standards to use the logo.
(C) It helps in easy identification of fortified commodities in the open market.
(D) The +F logo can only be printed in black and white on the front of the pack.

16. Match List I with List II:
List I: (Safe and Nutritious Food - SNF Initiatives)
P. SNF @ Home
Q. SNF @ School
R. SNF @ Workplace
S. SNF @ Hospital
List II: (Associated Guidance Book/Theme)
I. Orange Book
II. Pink Book
III. Yellow Book
IV. Nutritious food recovery (Dietary support)
Choose the correct matching option:
(A) P-I, Q-II, R-III, S-IV
(B) P-III, Q-I, R-II, S-IV
(C) P-II, Q-III, R-I, S-IV
(D) P-II, Q-I, R-III, S-IV

17. Which of the following best defines Social and Behaviour Change Communication (SBCC) in the context of food safety?
(A) A legal regulatory framework designed to penalize non-compliant food business operators.
(B) A strategic communication approach designed to influence behaviors toward safe food practices.
(C) A scientific laboratory process used to assess toxic chemical residues in imported foods.
(D) A logistical transport network designed to securely distribute agricultural produce nationwide.

18. Consider the following statements:
Statement I: FSSAI's 'Eat Right Mela' is designed as an infotainment platform to engage citizens on food safety and healthy diets.
Statement II: Eat Right Melas are exclusively organized for food industry professionals to trade new processing technologies.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

19. Arrange the UCO (Used Cooking Oil) repurposing process under RUCO in the correct operational sequence:
I. Conversion of UCO into Biodiesel via transesterification.
II. Storage of UCO by Food Business Operators in designated containers.
III. Collection by FSSAI-authorized UCO aggregators.
IV. Monitoring UCO quality using TPC meters.
(A) IV → II → III → I
(B) II → IV → I → III
(C) IV → III → II → I
(D) II → III → IV → I

20. Identify the correctly matched pair regarding FSSAI's initiatives on health and nutrition:
(A) DART - Dietary Allowances and Nutritional Requirements Book
(B) Trans-fat free India - Eradication of all saturated fats by 2025
(C) Aaj Se Thoda Kam - Reducing salt, sugar, and fat intake
(D) Repurpose Used Cooking Oil (RUCO) - Production of aviation fuel from UCO

21. What is the primary objective of the FSSAI initiative "Aaj Se Thoda Kam"?
(A) To encourage citizens to reduce intake of salt, sugar, and fat.
(B) To regulate and reduce the usage of synthetic food colourings.
(C) To decrease standard portion sizes of meals served in restaurants.
(D) To minimize food waste at the consumer level through education.

22. Consider the following statements regarding regulations on Partially Hydrogenated Oils (PHOs):
I. PHOs are the primary dietary source of industrial trans-fats.
II. FSSAI has banned the use of PHOs in all commercial food preparations starting from

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(A) P-II, Q-III, R-I, S-IV
(B) P-III, Q-II, R-IV, S-I
(C) P-I, Q-II, R-III, S-IV
(D) P-III, Q-II, R-I, S-I

7. How is the FSSAI Food Fortification Resource Centre (FFRC) primarily defined?
(A) A regulatory body within FSSAI prosecuting food industries that fail to fortify staples.
(B) A nodal agency under FSSAI promoting food fortification and providing technical support.
(C) A specialized testing laboratory dedicated to checking the chemical composition of grains.
(D) An international organization funding the procurement and supply of fortificants in India.

8. Consider the following statements:
Statement I: The +F logo on a food packet indicates that the product is fortified with specific micronutrients as per FSSAI standards.
Statement II: Use of the +F logo is mandatory for all packaged food products sold in India, regardless of their nutrient content.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

9. Arrange the typical steps involved in the Clean Street Food Hub (CSFH) certification process in the correct sequence:
I. Pre-audit assessment and gap analysis by FSSAI-empaneled agency.
II. Identification of a cluster of street food vendors (minimum 20).
III. Issuance of CSFH certification and display of board.
IV. Training and capacity building of vendors based on identified gaps.
(A) I → II → IV → III
(B) II → IV → I → III
(C) I → IV → II → III
(D) II → I → IV → III

10. Identify the correctly matched pair regarding Food Safety Display Boards (FSDB) colour codes and their respective food businesses:
(A) Purple - Restaurants and Food Service
(B) Green - Meat and Poultry Retail
(C) Red - Fresh Fruit and Vegetable Retail
(D) Yellow - Liquor Retail

11. What is the maximum permissible limit of Total Polar Compounds (TPC) in frying oil, beyond which it is deemed unfit for human consumption under FSSAI regulations?
(A) 15%
(B) 20%
(C) 25%
(D) 30%

12. Consider the following statements regarding the Special Nutrition Programme (SNP) and Mid-Day Meal (MDM) linkage with FSSAI:
I. FSSAI ensures that fortified wheat, rice, oil, and salt are mandatorily utilized in the MDM scheme.
II. Food Safety Display Boards are strictly prohibited in MDM kitchens to avoid consumer panic.
III. SNP aims to bridge the nutritional gap among preschool children, pregnant women, and lactating mothers.
IV. Local FSOs are tasked with periodically auditing MDM kitchens for hygiene and sanitation compliance.
Which of the statements given above are correct?
(A) I, II and III only
(B) I, III and IV only
(C) II, III and IV only
(D) I, II, III and IV

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13. Which of the following statements is correct regarding the Hygiene Rating System introduced by FSSAI?
(A) It is a voluntary scheme applicable to food service establishments.
(B) It applies exclusively to large-scale food manufacturing units.
(C) A rating of '1 smiley' indicates the highest standard of hygiene.
(D) It replaces the mandatory FSSAI licensing and registration process.

14. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Used Cooking Oil (UCO) must be strictly discarded and repurposed for biodiesel production under the RUCO initiative.
Reason (R): Repeated frying at high temperatures generates Total Polar Compounds (TPC) which possess carcinogenic and atherogenic properties.
(A) Both A and R are true and R is the correct explanation of A.

(C) Ninhydrin
(D) Phenolphthalein

62. Consider the following statements regarding the role of Food Safety Display Boards (FSDBs):
I. They empower consumers to make informed choices by displaying hygiene practices.
II. They outline the responsibilities of the food handlers in that specific establishment.
III. They are mandatory for all FBOs and must be displayed prominently.
IV. They feature a color-coding system specific to the type of food business.
Which of the statements given above are correct?
(A) I, II and IV only
(B) I, III and IV only
(C) I, II, III and IV
(D) II, III and IV only

63. Which of the following is a correct statement regarding the Eat Right School matrix?
(A) It relies entirely on heavily penalizing schools that repeatedly serve unhealthy foods.
(B) The program strictly prohibits school children from bringing homemade lunches from home.
(C) It is designed to be implemented exclusively in elite international board institutions.
(D) It encourages integrating food safety and nutrition education into school curriculums.

64. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Adding folic acid to wheat flour is a vital public health intervention.
Reason (R): Adequate maternal intake of folic acid significantly reduces the risk of neural tube defects in newborns.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

65. Identify the incorrect statement regarding the reduction of trans-fats.
(A) India pledged to become Trans-Fat Free by 2022, ahead of the WHO target of 2023.
(B) The regulations limit trans-fats only in imported food products, exempting domestic manufacturers.
(C) Trans-fats increase shelf-life and flavour stability, which historically made them popular in the industry.
(D) Bakeries and halwais are heavily targeted for training to use trans-fat free alternatives.

66. Match List I with List II:
List I: (Ingredient/Contaminant)
P. Trans-fatty acids
Q. Iodine deficiency
R. Total Polar Compounds
S. High Sugar
List II: (FSSAI Regulatory Action/Initiative)
I. RUCO
II. Mandatory limitation to $< 2\%$
III. Double Fortified Salt
IV. Front of Pack Labelling / HFSS guidelines
Choose the correct matching option:
(A) P-I, Q-II, R-III, S-IV
(B) P-II, Q-I, R-IV, S-III
(C) P-III, Q-IV, R-I, S-II
(D) P-II, Q-III, R-I, S-IV

67. How is "Safe and Nutritious Food (SNF) at Home" conceptualized by FSSAI?
(A) A campaign providing a 'Pink Book' to guide households on safe food storage and preparation.
(B) A direct supply scheme delivering weekly rations of fortified food products directly to homes.
(C) A formal regulatory framework allowing Food Safety Officers to inspect private family kitchens.
(D) A direct financial subsidy program supporting the procurement of organic fruits and vegetables.

68. Consider the following statements:
Statement I: The Hygiene Rating Scheme uses smiley icons to convey the hygiene standards to consumers intuitively.
Statement II: A rating of zero smileys indicates that the establishment is operating illegally and must be demolished.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

69. Which of the following is NOT a required criteria for an area to be certified as a Clean Street Food Hub?

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III. The trans-fat limit applies to both edible oils/fats and food products in which edible oils/fats are used.

IV. Hydrogenation inherently reduces the shelf-life of the oil.

Which of the statements given above are correct?

(A) II and IV only
(B) I, II and III only
(C) I, III and IV only
(D) I and III only

23. Which of the following is a correct statement about the formulation of Double Fortified Salt (DFS)?

(A) DFS is fortified with Calcium and Vitamin D to address bone health issues.
(B) DFS utilizes specific encapsulated forms of iron to prevent interaction with iodine.
(C) DFS is solely distributed through private retail channels and excluded from public distribution systems.
(D) DFS regulations prohibit the use of potassium iodate.

24. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A): Fortified rice is typically produced using extrusion technology to create Fortified Rice Kernels (FRK).

Reason (R): Extrusion ensures that micronutrients like iron, folic acid, and Vitamin B_{12} remain stable during during washing and cooking.

(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

25. Identify the incorrect statement regarding the FSSAI standards for fortified milk.

(A) Milk is standardly fortified with both Vitamin A and Vitamin D.
(B) Toned, double toned, and skimmed milk variants can be fortified.
(C) The added fortificants must not alter the natural taste or colour.
(D) Milk fortification is mandatory for all dairies operating in India.

26. Match List I with List II:

List I: (Target Area)

P. Railway Stations
Q. Places of Worship
R. School Canteens
S. Street Food Clusters

List II: (FSSAI Certification/Initiative)

I. BHOG
II. Clean Street Food Hub
III. Eat Right Station
IV. Eat Right School

Choose the correct matching option:

(A) P-III, Q-I, R-IV, S-II
(B) P-III, Q-II, R-IV, S-I
(C) P-I, Q-III, R-II, S-IV
(D) P-II, Q-I, R-IV, S-III

27. How does FSSAI define "Health Supplements"?

(A) Products containing concentrated sources of vitamins and minerals designed to replace normal daily meals entirely.
(B) Products intended to supplement the normal diet containing concentrated nutrients with physiological effects.
(C) Specialized pharmaceutical drugs manufactured and prescribed for treating specific clinically diagnosed diseases.
(D) Intravenous nutrient liquid solutions administered to critical patients under direct medical supervision.

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28. Consider the following statements:

Statement I: The Eat Right School programme categorizes food into Green, Yellow, and Red categories based on their nutritional profile.

Statement II: Foods categorized as 'Red' (High in Fat, Salt, and Sugar) are highly encouraged for distribution during school events.

(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

29. Arrange the implementation stages of a Social and Behaviour Change Communication (SBCC) campaign by FSSAI in chronological order:

I. Designing contextual communication materials (e.g., mascots, videos).
II. Conducting a baseline knowledge, attitude, and practice (KAP) survey.
III. Evaluating the impact of the campaign on dietary habits.
IV. Disseminating messages through mass media

(D) Water vending machines and retail stalls are included in the comprehensive audit.

46. Match List I with List II:
List I: (Initiative/Programme)
P. RUCO
Q. Clean Street Food Hub
R. Eat Right Mela
S. SNF @ Workplace
List II: (Key Objective)
I. Upgrading infrastructure and hygiene of unorganized food vendors
II. Fostering a healthy eating environment for employees
III. Preventing re-entry of degraded edible oil into the food chain
IV. Mass consumer outreach through interactive events
Choose the correct matching option:
(A) P-I, Q-III, R-II, S-IV
(B) P-III, Q-IV, R-I, S-II
(C) P-III, Q-I, R-IV, S-II
(D) P-II, Q-I, R-IV, S-III

47. What is the fundamental vision of the Eat Right India movement?
(A) To position India as the leading global exporter of processed foods and goods by 2030.
(B) To legally mandate an exclusively vegetarian diet across all national public institutions.
(C) To completely centralize food production processes under government-controlled enterprises.
(D) To transform the country's food system to ensure safe, healthy, and sustainable food.

48. Consider the following statements:
Statement I: Trans-fats can be naturally occurring in small amounts in meat and dairy products from ruminant animals.
Statement II: The FSSAI target for a Trans-fat free India only applies to naturally occurring trans-fats, not industrially produced ones.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

49. Arrange the following steps of oil degradation and disposal as targeted by the RUCO initiative in the correct sequence:
I. Generation of high levels of Total Polar Compounds (TPC).
II. Repeated frying of edible oil at high temperatures.
III. Discarding the oil into designated aggregation containers.
IV. Conversion into biodiesel.
(A) I → II → III → IV
(B) II → I → III → IV
(C) II → III → I → IV
(D) III → II → I → IV

50. Identify the correctly matched pair regarding the fortification of staples:
(A) Wheat Flour - Fortified with Vitamin C and Zinc elements
(B) Edible Oil - Fortified with dietary Iron and Iodine
(C) Salt - Fortified with Vitamin A and fat-soluble Vitamin D
(D) Rice - Fortified with Iron, Folic Acid, and Vitamin B_{12}

51. What specific digital application has FSSAI launched to help citizens verify the safety and compliance of food products and file grievances?
(A) Food Safety Connect
(B) Eat Right Tracker
(C) FSSAI Mitra
(D) Nutri-Check App

52. Consider the following statements regarding the hygiene rating scoring criteria:
I. It heavily evaluates water supply and handwashing facilities.
II. Food handlers' personal hygiene and medical fitness carry significant weightage.
III. Proper temperature control for high-risk foods is a critical evaluation parameter.
IV. The presence of a licensed security guard is mandatory for a 5-star rating.
Which of the statements given above are correct?
(A) I, II and IV only
(B) II, III and IV only
(C) I, II and III only
(D) I, III and IV only

53. Which of the following is a correct statement regarding FSSAI's regulations on Nutraceuticals and Health Supplements?
(A) They must comply with FSSAI limits for heavy metals and toxic contaminants.
(B) They are permitted to contain narcotic compounds if derived from natural plant

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for frying in commercial bakeries.
(C) Modifying the chemical structure of used oil to formulate new health supplements.
(D) Using degraded cooking oil exclusively for manufacturing organic cosmetic products.

38. Consider the following statements:
Statement I: The blending ratio for Fortified Rice Kernels (FRK) with normal rice is typically 1:100.
Statement II: Fortified rice must be washed vigorously with hot water to activate the micronutrients before cooking.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

39. Arrange the hierarchy of actions for an Eat Right Campus certification:
I. Self-assessment by the campus administration.
II. Final certification and grading by FSSAI.
III. Implementation of corrective actions based on gaps.
IV. Third-party audit by an FSSAI recognized agency.
(A) I → IV → III → II
(B) I → III → IV → II
(C) IV → I → III → II
(D) III → I → IV → II

40. Identify the correctly matched pair regarding FSSAI manuals and their specific target audience:
(A) Pink Book - Food Safety in Professional Kitchens
(B) Yellow Book - Food Safety in Hospitals
(C) Orange Book - Food Safety at Workplace
(D) Purple Book - Food Safety at Home

41. For how long is a Hygiene Rating certificate generally valid before a food service establishment must undergo a reassessment?
(A) 6 months
(B) 1 year
(C) 2 years
(D) 5 years

42. Consider the following statements regarding the reduction of High Fat, Sugar, and Salt (HFSS) foods:
I. FSSAI advocates for front-of-pack labelling to warn consumers about high HFSS content.
II. HFSS foods are completely banned from being manufactured in India.
III. The 'Aaj Se Thoda Kam' campaign specifically targets the reduction of HFSS intake.
IV. High intake of HFSS is directly linked to an increase in non-communicable diseases (NCDs).
Which of the statements given above are correct?
(A) I, III and IV only
(B) I and III only
(C) II, III and IV only
(D) I, II, III and IV

43. Which of the following statements correctly describes the linkage between Mid-Day Meal (MDM) programmes and FSSAI standards?
(A) MDM kitchens are completely exempt from FSSAI licensing to reduce paperwork for schools.
(B) FSSAI mandates that MDM kitchens must serve fortified staples to combat malnutrition.
(C) State governments can bypass FSSAI hygiene standards for rural school kitchens.
(D) Food prepared in MDM kitchens requires FSSAI approval before every individual serving.

44. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Adding Vitamin A to refined edible oil is a highly effective fortification strategy.
Reason (R): Vitamin A is a fat-soluble vitamin, and oil provides a natural matrix that enhances its absorption in the body.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

45. Identify the incorrect statement regarding the Eat Right Station initiative.
(A) The initiative focuses solely on the structural aesthetics of the station platforms.
(B) It encourages stations to set up separate kiosks for selling local organic foods.
(C) Stations with a 5-star rating demonstrate exceptional compliance with food safety and hygiene.

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and community outreach.
(A) II → I → IV → III
(B) I → II → IV → III
(C) II → IV → I → III
(D) I → IV → II → III

30. Identify the correctly matched pair regarding fortificants and their targeted public health issue:
(A) Vitamin B_{12} - Dietary prevention of scurvy
(B) Vitamin D - Clinical cause of night blindness
(C) Folic Acid - Prevention of neural tube defects
(D) Iron - Primary treatment for endemic goitre

31. What is the minimum number of street food vendors required to form a cluster eligible for the Clean Street Food Hub (CSFH) certification?
(A) 10
(B) 20
(C) 50
(D) 100

32. Consider the following statements regarding FSSAI regulations on Nutraceuticals:
I. Nutraceuticals must provide a physiological benefit and help maintain good health.
II. They can claim to cure, mitigate, or treat human diseases on their labels.
III. The label must explicitly state "Not for medicinal use".
IV. The quantity of nutrients added must not exceed the Recommended Dietary Allowance (RDA).
Which of the statements given above are correct?
(A) I, II and III only
(B) II, III and IV only
(C) I, III and IV only
(D) I, II and IV only

33. Which of the following is a correct statement concerning the Food Safety Display Boards (FSDB)?
(A) They are optional tools for large food manufacturing units.
(B) They contain the FSSAI license/registration number and a consumer grievance contact number.
(C) A single uniform design is used for all types of food businesses regardless of their nature.
(D) They explicitly list the recipes of the primary dishes served by the establishment.

34. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): FSSAI collaborates extensively with NGOs and academic institutions to implement Eat Right initiatives.
Reason (R): Government regulatory bodies lack the statutory authority to enforce food safety rules directly.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

35. Identify the incorrect statement regarding the Biodiesel production process from Used Cooking Oil (UCO).
(A) Biodiesel produced from UCO contains harmful trans-fats released during combustion.
(B) The chemical process used to convert UCO into Biodiesel is called transesterification.
(C) Industrial glycerol is generated as a standard by-product during this chemical process.
(D) FSSAI actively facilitates the commercial network between aggregators and manufacturers.

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36. Match List I with List II:
List I: (FSSAI Tool/Resource)
P. DART Book
Q. Food Safety Connect
R. FFRC Portal
S. FoSTaC
List II: (Primary Function/Target)
I. Training and certification of food safety supervisors
II. Detecting common adulterants at home
III. Consumer grievance and feedback application
IV. Technical resource for food fortification
Choose the correct matching option:
(A) P-III, Q-II, R-I, S-IV
(B) P-II, Q-IV, R-III, S-I
(C) P-II, Q-III, R-IV, S-I
(D) P-IV, Q-III, R-II, S-I

37. What does the term "Repurpose" specifically refer to in the RUCO initiative?
(A) Diverting discarded cooking oil to non-food applications, specifically biodiesel.
(B) Filtering used cooking oil to be safely reused

sources.
(C) They can be legally marketed as direct substitutes for prescribed life-saving drugs.
(D) They do not require any specific FSSAI labelling if they are certified 100% herbal.

54. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): The Eat Right Campus certification is highly beneficial for corporate organizations and universities.
Reason (R): It reduces the incidence of foodborne illnesses among employees/students, thereby improving overall productivity and attendance.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

55. Identify the incorrect statement regarding the Special Nutrition Programme (SNP).
(A) SNP operates primarily through the Integrated Child Development Services (ICDS) scheme.
(B) SNP primarily targets the affluent urban population to address obesity.
(C) The food provided under SNP must conform to FSSAI quality and safety standards.
(D) FSSAI recommends the use of fortified staples in the supplementary nutrition provided under SNP.

56. Match List I with List II:
List I: (FSDB Colour Code)
P. Green
Q. Red
R. Brown
S. Yellow
List II: (Specific Business Sector)
I. Street Food
II. Fruit and Vegetable Retail
III. Meat and Poultry Retail
IV. Manufacturing Units
Choose the correct matching option:
(A) P-II, Q-III, R-I, S-IV
(B) P-III, Q-II, R-IV, S-I
(C) P-II, Q-III, R-IV, S-I
(D) P-I, Q-IV, R-III, S-II

57. How does "Food Fortification" formally defined in the context of FSSAI regulations?
(A) The scientific process of genetically modifying crops to increase inherent nutrient levels.
(B) The technological process of removing anti-nutritional factors from raw agricultural produce.
(C) The preservation of commercial food products using chemical preservatives to extend shelf life.
(D) Deliberately adding essential vitamins and minerals to food to improve its nutritional quality.

58. Consider the following statements:
Statement I: RUCO requires all food business operators consuming more than 50 litres of frying oil per day to maintain usage records.
Statement II: Used Cooking Oil aggregated under RUCO is strictly purified and sold back to low-income households as cheap edible oil.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

59. Which of the following is NOT one of the broad thematic areas (pillars) of the Eat Right India movement?
(A) Eat Safe
(B) Eat Cheap
(C) Eat Healthy
(D) Eat Sustainable

60. Identify the correctly matched pair regarding FSSAI collaborative networks:
(A) Food Fortification Resource Centre (FFRC) - An independent NGO working outside FSSAI.
(B) NetProFaN - A collaborative network of medical, health, and nutrition professionals.
(C) Clean Street Food Hub - An initiative managed exclusively by the Ministry of Tourism.
(D) RUCO - A waste management scheme administered solely by the Ministry of Petroleum.

61. Which chemical reagent is commonly used in the test methods described in the DART book to detect the presence of iodine in salt?
(A) Starch solution
(B) Benedict's reagent

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CHAPTER 32

FSSAI Initiatives: Eat Right India, Food Fortification and Related Programmes

1. What are the three core pillars of the Eat Right India movement?
(A) Eat Local, Eat Fresh, Eat Organic
(B) Eat Safe, Eat Healthy, Eat Sustainable
(C) Eat Clean, Eat Nutritious, Eat Balanced
(D) Eat Traditional, Eat Fortified, Eat Regulated

2. Consider the following statements regarding the Eat Right Campus initiative:
I. It aims to promote safe, healthy, and sustainable food in campuses such as universities, hospitals, and workplaces.
II. The certification requires mandatory adherence to only the Food Safety and Standards Act, without any sustainability parameters.
III. Campuses are evaluated on a matrix that includes food safety measures, provision of healthy food, and environmental sustainability.
IV. A campus scoring below 50% in the audit is immediately penalised and shut down.
Which of the statements given above are correct?
(A) I, II and III only
(B) II and IV only
(C) I, III and IV only
(D) I and III only

3. Which of the following is a correct statement regarding the Eat Right Station initiative?
(A) Stations are audited by third-party agencies empaneled by FSSAI and rated on a scale of 1 to 5.
(B) It applies exclusively to the food served within the luxury trains of Indian Railways.
(C) Only the main canteens at the station are assessed, excluding the retail food vendors on the platforms.
(D) Certification is valid indefinitely once awarded by FSSAI.

4. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): FSSAI mandated the limitation of trans-fatty acids (TFAs) in all oils and fats to not more than 2% by weight.
Reason (R): High consumption of trans-fats increases the levels of High-Density Lipoprotein (HDL) in the blood, leading to cardiovascular diseases.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

5. Identify the incorrect statement regarding the rationale behind Food Fortification in India.
(A) It requires significant changes in the dietary habits of the target population.
(B) It is a scientifically proven, cost-effective, and scalable intervention to address micronutrient deficiencies.
(C) The nutrients added are in quantities that provide a significant portion of the Recommended Dietary Allowance (RDA).
(D) It does not alter the organoleptic properties (taste, colour, smell) of the food vehicles.

6. Match List I with List II:
List I: (Food Vehicle)
P. Salt
Q. Wheat Flour
R. Milk
S. Refined Edible Oil
List II: (Mandated/Standard Fortificants as per FSSAI)
I. Vitamin A and Vitamin D
II. Iron, Folic Acid, and Vitamin B_{12}
III. Iodine and Iron
IV. Vitamin A and Vitamin D
Choose the correct matching option:

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(A) Mandatory use of automated cooking systems for all street vendors.
(B) Guaranteed continuous access to clean and safe potable water sources.
(C) Implementation of proper waste disposal and garbage management systems.
(D) Strict maintenance of personal hygiene and cleanliness by food handlers.

70. Identify the correctly matched pair regarding FSSAI's digital outreach:
(A) Smart Consumer App - A tool used exclusively for filing RTIs against FSSAI.
(B) INFoLNET - A platform used for matching UCO aggregators with local restaurants.
(C) Eat Right Tracker - Specialized software used for tracking imported sea cargo.
(D) FoSCoS - Online platform for licensing and registration of Food Businesses.

71. What is the main objective of the DART book published by FSSAI?
(A) To list specific dietary requirements for professional athletes.
(B) To provide simple tests to detect food adulterants at home.
(C) To serve as a comprehensive legal manual for Food Safety Officers.
(D) To track the nutritional profiles of school mid-day meals.

72. Consider the following components of the Eat Right Mela:
I. Pavilions displaying different aspects of safe and healthy food.
II. Live demonstrations of detecting food adulteration.
III. Sale of highly processed HFSS foods at discounted rates to attract crowds.
IV. Interactive sessions with nutritionists and health experts.
Which of the statements given above are correct?
(A) I, III and IV only
(B) II, III and IV only
(C) I, II and IV only
(D) I, II, III and IV

73. Which of the following statements is correct regarding the Food Fortification Resource Centre (FFRC)?
(A) It operates strictly as a profit-making business entity selling fortificants.
(B) It only provides resources for fortifying non-essential and luxury food products.
(C) It restricts its educational and promotional operations entirely to rural areas.
(D) It aligns efforts of government, partners, and industry to promote fortification.

74. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): The +F logo is mandatory for any product claiming to be fortified under FSSAI standards.
Reason (R): The logo assures consumers that the product contains the specified micronutrients in scientifically recommended dosages.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

75. Identify the incorrect statement regarding the Eat Right Campus programme.
(A) It applies to academic institutions, corporate offices, and hospitals.
(B) The certification guarantees that the food provided on campus is entirely free of cost.
(C) Certification requires passing a comprehensive audit on food safety and healthy diets.
(D) It emphasizes the promotion of environmentally sustainable food practices.

76. Match List I with List II:
List I: (Fortificant)
P. Iodine
Q. Iron
R. Vitamin D
S. Vitamin A
List II: (Biological Role/Deficiency prevented)
I. Prevention of Anemia
II. Calcium absorption and bone health
III. Thyroid hormone synthesis and prevention of goitre
IV. Maintenance of normal vision and immune function
Choose the correct matching option:
(A) P-I, Q-III, R-IV, S-II
(B) P-III, Q-I, R-II, S-IV
(C) P-III, Q-II, R-I, S-IV
(D) P-II, Q-I, R-IV, S-III

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77. How does FSSAI categorize a "Clean Street Food Hub"?
(A) A cluster of 20 or more vendors selling safe, hygienic food in a marked zone.
(B) A single premium street food stall operating inside a modern air-conditioned mall.
(C) An online delivery platform aggregating registered local street food vendors.
(D) A demarcated street food zone where only pre-packaged factory foods are sold.

78. Consider the following statements:
Statement I: Extrusion technology for fortified rice involves mixing rice flour with a fortificant mix, and shaping it into rice-like kernels.
Statement II: Fortified rice kernels (FRK) are consumed independently as health supplements, similar to medicinal tablets.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

79. Which of the following is NOT an approved method of consumer awareness deployed by FSSAI for Eat Right India?
(A) Utilizing brand ambassadors and mascots such as Master Sehat.
(B) Organizing community Eat Right Melas and public Walkathons.
(C) Disseminating educational details through social media channels.
(D) Broadcasting false claims to induce fear of unfortified foods.

80. Identify the incorrectly matched pair regarding the FSSAI "Eat Right" publications:
(A) Pink Book - Safe and Nutritious Food at Home
(B) Yellow Book - Safe and Nutritious Food at School
(C) DART Book - Guidelines for prescribing Nutraceuticals
(D) Orange Book - Safe and Nutritious Food at Workplace

81. Which technological instrument is mandated or recommended by FSSAI to instantly measure oil degradation at food service establishments?
(A) Spectrophotometer
(B) TPC Meter
(C) Gas Chromatograph
(D) Refractometer

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82. Consider the following statements regarding collaborations for the Eat Right India movement:
I. FSSAI partners with civil society organizations (CSOs) to reach grassroots levels.
II. Professional bodies like NetProFaN provide scientific validity and expert talks.
III. The food industry is strictly barred from participating in Eat Right initiatives due to conflict of interest.
IV. Academic institutions are engaged for research and behavioural studies.
Which of the statements given above are correct?
(A) I, II and III only
(B) II, III and IV only
(C) I, III and IV only
(D) I, II and IV only

83. Which of the following is a correct statement regarding the integration of fortification in the Mid-Day Meal (MDM) scheme?
(A) It aims to systematically address micronutrient malnutrition in school children.
(B) Fortified staples are only used sporadically based on the surplus grain with the FCI.
(C) Only double fortified salt is mandated; fortified oils and rice are fully prohibited.
(D) Schools are required to bear the extra cost of fortification from student fees.

84. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Repurposing Used Cooking Oil (UCO) into biodiesel yields positive environmental impacts.
Reason (R): It prevents the clogging of drainage systems and reduces greenhouse gas emissions when used as an alternative fuel.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

85. Identify the incorrect statement regarding the reduction of salt, sugar, and fat in processed foods.
(A) Compliant food items are exempt from displaying the mandatory FSSAI license.
(B) FSSAI actively collaborates with

manufacturers to voluntarily reformulate products.
(C) Reducing these elements is vital to combat the sharp rise of chronic diseases.
(D) The initiative promotes clear nutritional labelling to help consumers make choices.

86. Match List I with List II:
List I: (FSSAI Program/Initiative)
P. Eat Safe
Q. Eat Healthy
R. Eat Sustainable
S. RUCO
List II: (Core Philosophy)
I. Reduction of carbon footprint and food waste
II. Ensuring personal and environmental hygiene
III. Promoting dietary diversity and fortification
IV. Circular economy approach
Choose the correct matching option:
(A) P-I, Q-II, R-III, S-IV
(B) P-III, Q-I, R-IV, S-II
(C) P-II, Q-IV, R-I, S-III
(D) P-II, Q-III, R-I, S-IV

87. What does the "Trans-Fat Free" logo visually signify when displayed on a food product or bakery?
(A) The food product is made entirely without the use of any commercial edible oils.
(B) The food contains industrial trans-fats of not more than 0.2g per 100g of food.
(C) The food product contains absolutely zero saturated fats or hydrogenated lipids.
(D) The certified shop only sells raw, unprocessed organic fruits and vegetables.

88. Consider the following statements:
Statement I: The Special Nutrition Programme (SNP) relies on the distribution of supplementary nutrition to vulnerable populations via Anganwadi centres.
Statement II: FSSAI plays a crucial role in prescribing the food safety and quality standards for the nutritional supplements distributed under SNP.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

89. Which of the following is NOT an intended benefit of implementing the Hygiene Rating System for consumers?
(A) It provides transparency regarding the hygiene conditions of a restaurant.
(B) It allows consumers to make informed choices about where to eat.
(C) It builds trust and confidence in the food service sector.
(D) It guarantees a 100% discount on food bills if the rating is below 3 stars.

90. Identify the incorrectly matched pair regarding the criteria for Eat Right Station certification:
(A) Luggage Handling - Must be sanitized using ultraviolet irradiation hourly
(B) Water Vending Machines - Must meet IS 10500 standards for drinking water
(C) Retail Stalls - Must prominently display valid FSSAI registration/license
(D) Base Kitchens - Must undergo mandatory third-party hygiene auditing tasks

91. What form of iron is predominantly mandated by FSSAI for the fortification of Double Fortified Salt (DFS)?
(A) Standard elemental iron powder without any coating
(B) Encapsulated ferrous sulphate or ferrous fumarate
(C) Highly soluble liquid ferric chloride solutions
(D) Synthetic red iron oxide chemical pigments

92. Consider the following statements about FSSAI's digital outreach:
I. FSSAI uses social media campaigns to dispel common myths about food safety.
II. Digital outreach completely replaces physical inspections by Food Safety Officers.
III. The FFRC portal provides technical resources to food business operators electronically.
IV. FSSAI launched e-learning modules under FoSTaC.
Which of the statements given above are correct?
(A) I, II and III only
(B) I, III and IV only
(C) II, III and IV only
(D) I, II, III and IV

93. Which of the following statements correctly highlights the significance of the Eat Right Campus initiative for workplace environments?
(A) It reduces non-communicable diseases among

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lab test reports of the final flour.
(D) The commercial marketing and advertising budget for the +F logo campaign.

127. What is the primary goal of organizing an 'Eat Right Mela' at the state or district level?
(A) To generate maximum commercial revenue for local food authorities via stall rentals.
(B) To solely distribute free fortified food rations to below-poverty-line families.
(C) To actively recruit and train new Food Safety Officers directly from the public.
(D) To educate citizens about safe, healthy, and sustainable diets via an engaging event.

128. Consider the following statements:
Statement I: Consumer awareness applications like 'Food Safety Connect' allow citizens to report unhygienic practices in food establishments directly to FSSAI.
Statement II: The app is restricted to report issues only in 5-star hotels.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

129. Which of the following is NOT an approved form of iron fortificant for Double Fortified Salt as per FSSAI regulations?
(A) Encapsulated Ferrous Sulphate compounds
(B) Unencapsulated elemental iron filings
(C) Encapsulated Ferrous Fumarate compounds
(D) Standard food-grade Ferric Pyrophosphate

130. Identify the incorrectly matched pair regarding the initiative and its primary target stakeholder:
(A) Eat Right School - Students, Teachers, and Parents
(B) Clean Street Food Hub - Street Food Vendors and Local Administration
(C) RUCO - Biodiesel Manufacturers and Large-scale FBOs
(D) Eat Right Station - Airport Authority of India

131. Cause: Prolonged consumption of certain health supplements containing fat-soluble vitamins (like Vitamin A and D) vastly exceeding the Recommended Dietary Allowance (RDA).
Effect: Which of the following is the most likely physiological consequence?
(A) Hypervitaminosis and potential toxicity.
(B) Immediate development of scurvy.
(C) Increased bone fragility and osteomalacia.
(D) Total immunity against all viral infections.

132. Concept Application: When designing a Food Safety Display Board (FSDB) for a meat and poultry shop, which specific colour code and icon set must be utilized according to FSSAI guidelines?
(A) Green border with vegetarian icons and instructions for fresh produce retailers.
(B) Yellow border focusing strictly on standard deep-frying oil temperatures.
(C) Red border with raw meat handling and cross-contamination prevention rules.
(D) Purple border highlighting specific allergen safety information for bakeries.

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133. Which of the following statements correctly highlights the role of FFRC in capacity building?
(A) FFRC conducts training and workshops for FBOs to standardize fortification.
(B) FFRC directly funds industrial infrastructure setups for private millers.
(C) FFRC is responsible for issuing standard FSSAI licenses to street vendors.
(D) FFRC trains local agricultural workers on safe usage of chemical pesticides.

134. Case Study: During an inspection of a milk processing plant utilizing the +F logo, the FSO finds that the plant is adding Vitamin A, but not Vitamin D. According to FSSAI regulations on milk fortification, what is the compliance status?
(A) Compliant, as fortifying with either Vitamin A or D is legally sufficient.
(B) Compliant, provided that they double the daily dosage of Vitamin A added.
(C) Non-compliant, as milk must also be fortified with active Iron and Iodine.
(D) Non-compliant, as milk must contain both Vitamin A and D for +F status.

135. Identify the incorrect statement regarding the Eat Right Station hygiene requirements.
(A) The station must ensure proper segregation and disposal of wet and dry waste.
(B) Pests and rodents are permitted in storage areas if food is packed in plastic.
(C) All food handlers operating stalls must undergo mandatory FoSTaC training.
(D) All retail vendors must hold valid FSSAI licenses or formal registrations.

consequence as per FSSAI guidelines?
(A) The oil is declared unfit and must be disposed of under the RUCO initiative.
(B) The oil is deemed enriched and highly suitable for premium quality cooking.
(C) The restaurant is automatically awarded a five-star hygiene rating for zero waste.
(D) The degraded oil must be systematically diluted with fresh oil and then reused.

102. An FSO is calculating the potential potential generation of UCO for a city. If a large fast-food chain branch consumes 100 litres of fresh oil daily and discards 20% of it due to TPC limits, how much UCO does this single branch contribute to the RUCO aggregator per week (7 days)?
(A) 20 Litres
(B) 100 Litres
(C) 140 Litres
(D) 700 Litres

103. Which of the following statements correctly describes the mandate for FBOs regarding the +F logo?
(A) Any licensed FBO can use the +F logo voluntarily without conducting any product tests.
(B) FBOs must meet specific micronutrient levels in FSS regulations to use the +F logo.
(C) The +F logo indicates that the food is completely free from chemical preservatives.
(D) The +F logo is exclusively applicable to high-value imported packaged food products.

104. Case Study: A cluster of street food vendors applied for the Clean Street Food Hub certification. During the pre-audit, it was found that the vendors do not have access to a municipal water supply and use untreated groundwater. What is the most appropriate action required before certification?
(A) Grant the formal certification conditionally and ignore the current water source.
(B) Advise the street vendors to boil their food longer to compensate for water issues.
(C) Mandate a central RO plant or safe potable water provision before certifying.
(D) Shut down the entire street food market permanently through local police action.

105. Identify the incorrect statement regarding health supplements and nutraceuticals under FSSAI.
(A) They are intended to supplement the diet, not replace it.
(B) The label must not claim to cure any specific human disease.
(C) Ingredients must be from permitted botanical, mineral, or biological sources listed by FSSAI.
(D) They are regulated under the same category and strictures as Schedule H pharmaceutical drugs.

106. Competency: As a Food Safety Officer advising a school administration on implementing the 'Eat Right School' programme, which resource would you predominantly recommend for guiding their daily operations and curriculum?
(A) The Yellow Book
(B) The Orange Book
(C) The Pink Book
(D) The DART Manual

107. What is the primary reason for choosing milk as a vehicle for Vitamin D fortification?
(A) Raw cow milk naturally lacks any real nutritional value or health benefits.
(B) Vitamin D integrates well with milk's fat content, improving calcium absorption.
(C) Vitamin D acts as an organic preservative, completely preventing milk spoilage.
(D) It alters the natural colour of milk, making it highly appealing to children.

108. Consider the following statements:
Statement I: Food Safety Display Boards (FSDBs) should be placed in areas not visible to consumers to prevent them from reading the technical details.
Statement II: FSDBs contain instructions on safe food handling practices tailored to the specific type of food business.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

109. Which of the following is NOT an objective of the Food Fortification Resource Centre (FFRC)?
(A) Setting maximum retail prices (MRP) for all fortified food commodities.
(B) Sensitizing the states to adopt fortified staples in safety net programs (MDM, PDS, ICDS).
(C) Providing technical support to the food industry for fortification.

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(A) The station receives a five-star rating because the retail stalls are compliant.
(B) The base kitchen is fully ignored, as it operates entirely behind the scenes.
(C) The station fails, as the base kitchen is critical to the safety ecosystem.
(D) The station is awarded a compromise three-star rating to encourage progress.

145. Identify the incorrect statement regarding the exclusions of the Hygiene Rating Scheme.
(A) The scheme is currently applicable to food service establishments like restaurants, cafes, and fine dining.
(B) The scheme is primarily designed to assess heavy chemical manufacturing units.
(C) Establishments must possess a valid FSSAI license/registration to participate.
(D) Sweets and meat retail shops can also be rated under specific modules of the scheme.

146. Competency: You are formulating a health supplement targeted at pregnant women. According to FSSAI standards, the addition of vitamins and minerals must not exceed which threshold?
(A) 50% of the Recommended Dietary Allowance (RDA)
(B) 10 times the RDA
(C) There is no upper limit for natural vitamins
(D) One Recommended Dietary Allowance (1 RDA)

147. What represents the ultimate, holistic vision of the Eat Right India movement, blending both regulatory and capacity-building approaches?
(A) Shifting from rigid regulation to self-compliance and empowering citizens.
(B) Creating a rigid regulatory policing state where unhygienic vendors are jailed.
(C) Mandating that all domestic food processing is done by foreign corporations.
(D) Eliminating all traditional and local street foods from the Indian landscape.

148. Consider the following statements:
Statement I: FSSAI collaborates with the food industry to voluntarily phase out trans-fats and reformulate products to be healthier.
Statement II: The food industry is legally bound to purchase fortificants exclusively from FSSAI's own manufacturing plants.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

149. Which of the following is NOT a required standard for an area to be certified as a Clean Street Food Hub?
(A) The hub must have a centralized air-conditioning system for open-air stalls.
(B) All vendors operating in the hub must prominently display the required FSDBs.
(C) Proper handwashing facilities and continuous access to clean water are mandatory.
(D) Garbage bins across the hub must be strictly covered and emptied regularly.

150. Identify the incorrectly matched pair regarding the Eat Right India theme and its corresponding action:
(A) Eat Safe - Maintaining hygiene and combating adulteration
(B) Eat Healthy - Promoting fortified foods and reducing HFSS intake
(C) Eat Sustainable - Promoting local and seasonal foods, reducing food waste
(D) Eat Fast - Encouraging the consumption of ultra-processed instant meals

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evidence-based data for formulating standards.
Statement II: Academia is strictly forbidden from participating in FSSAI's consumer awareness campaigns.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

119. Which of the following is NOT a feature of the Orange Book published by FSSAI?
(A) Guidelines for organizing healthy meetings and events in the office.
(B) Protocols for diagnosing and clinically treating severe food allergies.
(C) Advice on creating a health and wellness culture in the workplace.
(D) Guidance for evaluating and auditing workplace canteens.

120. Identify the incorrectly matched pair regarding the timelines and targets of FSSAI regulations:
(A) Trans-fat limit of 2% - Mandatorily enforced across the nation by 2022
(B) Trans-fat Free India - Aligned with WHO's target but aimed for 2022
(C) Mandatory 100% organic farming - Targeted by 2025 across all Indian states
(D) PHO complete elimination - Initiated to align with trans-fat targets

121. Cause: Comprehensive food safety and hygiene training is imparted to cooks and helpers in Mid-Day Meal (MDM) kitchens under FoSTaC.
Effect: What is the most likely outcome?
(A) A major and continuous increase in the cost of all food ingredients.
(B) Complete transition of the MDM scheme to a fully privatized model.
(C) Total elimination of the basic need for raw nutritional standards.
(D) Reduction in instances of foodborne illnesses among school children.

122. Concept Application: To establish a successful RUCO collection network in a metropolitan city, which of the following structural links is absolutely essential?
(A) Aggregators collecting UCO from FBOs and delivering it to biodiesel plants.
(B) Encouraging households to pour UCO into municipal drains for sewage collection.
(C) Modifying standard car engines to run directly on unfiltered cooking oil.
(D) Selling the aggregated UCO back to local street vendors at subsidized rates.

123. Which of the following is a correct statement regarding the usage conditions of the +F logo?
(A) It must be printed strictly on the back of the package in microscopic font size.
(B) It requires FBOs to maintain records of fortificant procurement and quality tests.
(C) It completely replaces the standard green or red vegetarian food symbols.
(D) It can be used for foods that naturally contain high levels of vitamins at source.

124. Case Study: A rice miller is producing fortified rice. The miller blends Fortified Rice Kernels (FRK) with regular rice at a ratio of 1:100. However, laboratory tests show the final blended rice has inconsistent micronutrient levels (some batches very high, some very low). What is the most likely operational failure?
(A) The active iron in the FRK is completely evaporating during standard blending.
(B) Improper blending machinery or inadequate mixing leading to non-homogeneity.
(C) The raw regular rice is actively absorbing the surface vitamins from the FRK.
(D) The standard blending ratio must be changed to 1:1 to guarantee consistency.

125. Identify the incorrect statement regarding the 'SNF @ Workplace' initiative.
(A) It mandates a completely vegan diet for all corporate canteens.
(B) It aims to foster a healthy food environment for employees.
(C) The initiative uses the Orange Book as a resource guide.
(D) It encourages workplaces to undergo the Eat Right Campus certification.

126. Competency: An FSO is evaluating a wheat flour manufacturing unit for fortification compliance. The unit claims to fortify flour with Iron, Folic Acid, and Vitamin B_{12}. What specific document/record must the FSO verify to ensure regulatory compliance?
(A) The detailed daily attendance and shift registers of all factory workers.
(B) The official import license documents and clearance for the wheat grain.
(C) The CoA of the fortificant premix and the

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employees by promoting balanced diets.
(B) It encourages longer working hours by introducing free high-sugar energy drinks.
(C) It mandates that all workplaces must grow organic food within office premises.
(D) It limits the standard cafeteria menu to only three basic staple food items.

94. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): In Double Fortified Salt, iron and iodine can chemically react with each other if not properly formulated.
Reason (R): Encapsulation of iron compounds is utilized to provide a physical barrier, ensuring the stability of both iodine and iron during shelf life.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

95. Identify the incorrect statement regarding FSSAI regulations on Partially Hydrogenated Oils (PHO).
(A) Vanaspati and margarine are traditional examples of products rich in PHOs.
(B) PHOs are produced by adding hydrogen to liquid vegetable oils to make them more solid.
(C) FSSAI promotes the use of PHOs in bakeries as they are a healthy source of essential fatty acids.
(D) The elimination of PHOs is the primary mechanism to achieve the Trans-Fat Free India target.

96. Match List I with List II:
List I: (Stakeholder in RUCO)
P. Food Business Operator (FBO)
Q. UCO Aggregator
R. Biodiesel Manufacturer
S. FSSAI
List II: (Role/Responsibility)
I. Regulates and facilitates the ecosystem
II. Converts waste oil into fuel
III. Collects UCO from various establishments
IV. Stores UCO separately and monitors TPC
Choose the correct matching option:
(A) P-III, Q-IV, R-I, S-II
(B) P-IV, Q-II, R-III, S-I
(C) P-IV, Q-III, R-II, S-I
(D) P-I, Q-III, R-II, S-IV

97. How is the "Eat Right Station" standard aligned with the overarching Eat Right India movement?
(A) By focusing exclusively on the speed of delivery of hot food to transit passengers.
(B) By bringing railway catering under safe, healthy, and sustainable food practices.
(C) By completely removing all commercial street food vendors from railway premises.
(D) By replacing all traditional regional cuisines with standardized packaged meals.

98. Consider the following statements:
Statement I: The Clean Street Food Hub initiative provides specialized training to vendors on personal hygiene, pest control, and proper waste disposal.
Statement II: Once an area is declared a Clean Street Food Hub, regular surveillance is no longer required.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

99. Which of the following is NOT a pillar of the FSSAI's Social and Behaviour Change Communication (SBCC) strategy?
(A) Enforcing penalties without prior notice for minor infractions.
(B) Empowering consumers by providing verified safety information.
(C) Nudging food businesses to voluntarily comply with standards.
(D) Creating a culture of food safety through mass media campaigns.

100. Identify the incorrectly matched pair regarding fortification vehicles and their common fortificants:
(A) Salt - Fortified with Iodine and Iron
(B) Wheat Flour - Iron, Folic Acid, and Vitamin B_{12}
(C) Refined Oil - Vitamin B and Vitamin C
(D) Milk - Fortified with Vitamin A and D

101. Cause: A restaurant repeatedly uses cooking oil until the Total Polar Compounds (TPC) reach 35%.
Effect: Which of the following is the regulatory

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136. Competency: While evaluating the label of a newly launched Nutraceutical product, an FSO notices the claim: "Cures Type 2 Diabetes within 30 days." What is the appropriate regulatory response?
(A) Approve the label completely as it provides a strong marketing claim.
(B) Request the manufacturer to modify the claim from 30 days to 60 days.
(C) Reject the label, as nutraceuticals cannot make disease-curing claims.
(D) Transfer the product file to the Ministry of Ayush for verification.

137. Which of the following best describes the importance of behavioural change in food safety as advocated by FSSAI?
(A) Sustained behavioural change completely replaces the need for any legal food standards.
(B) It is a strategic approach designed to reduce the overall operational budget of FSSAI.
(C) It is a direct policy that focuses solely on forcing individuals to eat less food.
(D) Sustained safety requires voluntary hygiene by handlers and informed consumer choices.

138. Consider the following statements:
Statement I: Non-Governmental Organizations (NGOs) play a pivotal role in the SNF programs by conducting grassroots level awareness campaigns.
Statement II: FSSAI provides financial grants to NGOs to completely take over the regulatory enforcement in rural districts.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

139. Which of the following action points is NOT part of the 'Eat Safe' pillar of Eat Right India?
(A) Maintaining high personal hygiene by all active food handlers.
(B) Promoting plant-based meat alternatives to save the environment.
(C) Ensuring proper thermal cooking and food holding temperatures.
(D) Keeping food covered to protect it from stray insects and pests.

140. Identify the incorrectly matched pair regarding the FSSAI manual and its target audience:
(A) Pink Book - Homemakers and Domestic Workers
(B) DART Book - Heavy Machinery Operators
(C) Yellow Book - School Administration and Teachers
(D) Orange Book - Factory Workers and Corporate Employees

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141. Cause: Fortification of refined edible oil with Vitamin A.
Effect: Since Vitamin A is highly sensitive to light (photodegradation), what operational measure is highly recommended for the packaging of fortified oil?
(A) Using opaque pouches, tins, or dark bottles to prevent light exposure.
(B) Using completely transparent clear glass bottles for retail display.
(C) Leaving the product containers unsealed to permit continuous aeration.
(D) Storing the processed oil strictly under direct and hot sunlight.

142. Concept Application: A bakery wants to actively participate in the 'Reducing Salt, Sugar and Fat' initiative. Which of the following operational changes would best reflect this commitment?
(A) Replacing standard butter with hydrogenated oils such as commercial Vanaspati.
(B) Adding approved synthetic food colours to make the products look healthier.
(C) Cutting added sugar by 15% and using whole wheat instead of refined flour.
(D) Increasing sodium chloride content to extend the shelf life of baked breads.

143. Which of the following is a correct statement regarding the standard of Biodiesel produced under the RUCO initiative?
(A) It is used as turbine fuel without any further chemical refining.
(B) It is toxic and cannot be blended with standard petroleum diesel.
(C) It is only permitted for use in tractors, not passenger vehicles.
(D) It must comply with BIS specifications for Biodiesel (IS 15607).

144. Case Study: A railway station applies for the Eat Right Station certification. The FSSAI audit team finds that while all retail stalls are compliant, the base kitchen serving the station has major pest infestations and untrained staff. What will be the outcome?

(D) Creating consumer awareness about the health benefits of fortified foods.

110. Identify the incorrectly matched pair regarding the maximum TPC limit and regulatory action:
(A) TPC below 15% - Oil is safe for continuous commercial frying
(B) TPC at 24% - Oil is nearing discard limit, requiring monitoring
(C) TPC at 40% - Permitted for frying only in unorganized sectors
(D) TPC above 25% - Oil is mandated to be discarded and repurposed

111. Cause: Total elimination of Partially Hydrogenated Oils (PHOs) from the commercial food supply chain.
Effect: What is the most direct public health benefit resulting from this action?
(A) Complete eradication of Vitamin A deficiency among school children.
(B) Drastic reduction in the clinical incidence of endemic goitre.
(C) Total cure of all genetic metabolic disorders in the population.
(D) Decline in cardiovascular diseases caused by industrial trans-fats.

112. Concept Application: A restaurant chain wants to implement the FSSAI Hygiene Rating Scheme across its 50 outlets. The management must prioritize which of the following to score the highest rating?
(A) Upgrading the aesthetic dining hall furniture and installing modern sound systems.
(B) Expanding the culinary menu to include premium exotic imported ingredients.
(C) Ensuring Schedule 4 compliance, FoSTaC staff training, and hiring a supervisor.
(D) Reducing the standard menu prices of all served meals by exactly fifty percent.

113. Which of the following is a correct statement regarding the logistics of the Special Nutrition Programme (SNP)?
(A) SNP food products strictly bypass FSSAI labelling regulations because they are free.
(B) Supplementary food composition is standardized based on target demographic needs.
(C) Distributed food items are exclusively imported from international relief agencies.
(D) The logistics and distribution rely entirely on private e-commerce platforms.

114. Case Study: A large corporate IT park aims to receive the 'Eat Right Campus' certification. During the audit, it is found that the cafeterias serve predominantly high-fat, high-sugar foods, and have poor waste segregation. Which of the pillars of Eat Right India are they failing?
(A) Eat Safe and Eat Local only
(B) Eat Cheap and Eat Fresh only
(C) Eat Organic and Eat Safe only
(D) Eat Healthy and Eat Sustainable

115. Identify the incorrect statement regarding the transesterification process in biodiesel production from UCO.
(A) The process removes toxins, making the biodiesel safe for human consumption.
(B) It reacts used cooking oil with alcohol in the presence of a standard catalyst.
(C) Biodiesel produced has standard combustion properties similar to petroleum diesel.
(D) It produces industrial glycerol as a highly valuable commercial co-product.

116. Competency: While auditing a newly formed Clean Street Food Hub, a Food Safety Officer notices that vendors are reusing the same cloth to wipe down raw meat blocks and cooked food counters. Which critical food safety principle is being violated, requiring immediate corrective action?
(A) Implementation of FIFO storage protocols
(B) Strict compliance with fortification rules
(C) Prevention of food cross-contamination
(D) Proper adherence to RUCO guidelines

117. What is considered the most effective Social and Behaviour Change Communication (SBCC) strategy to reach rural and semi-urban populations regarding food safety?
(A) Using vernacular media, street plays, and community health workers.
(B) Publishing lengthy papers in international academic journals.
(C) Restricting social communication to Twitter and LinkedIn platforms.
(D) Sending weekly automated educational emails written in English.

118. Consider the following statements:
Statement I: FSSAI collaborates with academia to conduct scientific risk assessments and gather

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ANSWERS

1. (B) Eat Safe, Eat Healthy, Eat Sustainable
The Eat Right India movement, spearheaded by the Food Safety and Standards Authority of India, is built upon three essential pillars to transform the national food ecosystem. These pillars focus on ensuring food safety, promoting healthy diets, and encouraging environmentally sustainable food systems to enhance overall public health and nutrition across the country.

2. (D) I and III only
Under the Eat Right Campus initiative, campuses like universities, hospitals, and workplaces are evaluated on safe, healthy, and sustainable food parameters. The certification process does not rely solely on the Food Safety Act, as it includes ecological factors, nor does a low score result in immediate shutdown; instead, corrective actions are suggested.

3. (A) Stations are audited by third-party agencies empaneled by FSSAI and rated on a scale of 1 to 5.
Under the Eat Right Station initiative, food safety and hygiene standards at railway stations are evaluated. Third-party auditing agencies, officially empaneled by the regulator, conduct comprehensive assessments of all food handlers, retail stalls, and kitchens. Stations receive ratings from one to five stars, and this certification remains valid for a specific duration.

4. (C) A is true but R is false.
The national regulator has successfully mandated the reduction of trans-fatty acids in all edible oils and fats to a maximum limit of two percent by weight. However, consumption of trans-fats is medically proven to increase low-density lipoprotein levels while decreasing high-density lipoprotein in the blood, significantly elevating risks of cardiovascular diseases.

5. (A) It requires significant changes in the dietary habits of the target population.
Food fortification is recognized as a highly cost-effective, scalable, and scientifically proven method to address widespread micronutrient deficiencies. Since the nutrients are integrated directly into widely consumed staples like salt, milk, and rice, the process does not require any change in the food habits, taste, colour, or smell of the consumer population.

6. (D) P-III, Q-II, R-I, S-I
According to the standards established by the national food regulator, distinct staple foods are designated for specific nutrient additions. Salt is fortified with iodine and iron, wheat flour is enriched with iron, folic acid, and vitamin B12, while milk and refined edible vegetable oils are both fortified with fat-soluble vitamins A and D.

7. (B) A nodal agency under FSSAI promoting food fortification and providing technical support.
The Food Fortification Resource Centre functions as a specialized resource hub established within the national regulator. It plays a critical role in promoting food fortification across the country by offering technical support to food business operators, aligning safety net programs, and fostering collaboration among industries, government departments, and developmental partners.

8. (C) Statement I is true but Statement II is false.
The specialized plus F logo printed on food packaging signifies that the product contains added vitamins and minerals in compliance with the mandated standards. While this logo helps consumers identify enriched staples, its application is strictly limited to fortified foods and is not mandatory for standard non-fortified packaged foods in the market.

9. (D) II → I → IV → III
The Clean Street Food Hub certification follows a structured process. First, a cluster containing a minimum of twenty street food vendors is identified. Next, an empaneled agency conducts a pre-audit assessment to identify gaps, followed by targeted training and capacity building. Finally, the certification is awarded upon meeting the required hygiene standards.

10. (A) Purple - Restaurants and Food Service
Food Safety Display Boards are colour-coded to help consumers easily identify the type of establishment and its specific safety guidelines.

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The purple colour code is specifically assigned to restaurants and food services. Other colours, like green, red, and yellow, are designated for retail, manufacturing, and other specialized food sectors respectively.

11. (C) 25%
During the continuous frying of food at high temperatures, the chemical structure of edible oil degrades, leading to the formation of polar compounds. The national regulatory standards have established that the maximum permissible limit of total polar compounds is twenty-five percent, beyond which the oil is considered unsafe for consumption.

12. (B) I, III and IV only
FSSAI actively ensures the utilization of fortified staple foods in the Mid-Day Meal and Special Nutrition Programmes to combat malnutrition in children and mothers. Local officers conduct periodic hygiene audits of kitchens, and the use of Food Safety Display Boards is highly encouraged, not prohibited, to maintain transparency and food safety awareness.

13. (A) It is a voluntary scheme applicable to food service establishments.
The Hygiene Rating Scheme is a voluntary initiative introduced by the regulator specifically for food service establishments like restaurants and cafes. It evaluates compliance with food safety and hygiene standards based on audits, awarding smiley symbols to denote levels of cleanliness, and operates parallel to mandatory licensing rather than replacing it.

14. (A) Both A and R are true and R is the correct explanation of A.
Repeated frying of cooking oil at elevated temperatures causes chemical degradation and generates total polar compounds, which are associated with serious health risks like cardiovascular diseases and cancer. Consequently, regulations mandate discarding such oil and repurposing it into biodiesel through the sustainable Repurpose Used Cooking Oil initiative.

15. (D) The +F logo can only be printed in black and white on the front of the pack.
The plus F logo serves as a clear visual indicator for consumers to identify fortified foods meeting national standards. Food businesses must comply strictly with the prescribed nutrient levels to use it. FSSAI permits this logo to be printed in specified colour schemes, and it is not restricted to black and white.

16. (C) P-II, Q-III, R-I, S-IV
The Safe and Nutritious Food initiatives utilize tailored guidance manuals for different settings. The Pink Book is designed for home food safety, the Yellow Book targets schools, and the Orange Book provides guidelines for workplaces, while hospitals focus on specialized recovery diets to ensure patients receive appropriate clinical nutrition during their recovery.

17. (B) A strategic communication approach designed to influence behaviors toward safe food practices.
Social and Behaviour Change Communication is a strategic, evidence-based approach that utilizes targeted messaging, community engagement, and visual tools. Within the food sector, it is deployed to positively influence individual and collective behaviors, encouraging food handlers and consumers to consistently adopt safe, healthy, and hygienic food practices in their daily routines.

18. (C) Statement I is true but Statement II is false.
The Eat Right Mela is structured as a citizen-centric infotainment platform aimed at raising public awareness regarding safe, healthy, and sustainable food practices. These interactive festivals are designed for the general public, incorporating stalls, quizzes, and live demonstrations, and are not restricted exclusively to industrial professionals or corporate trade purposes.

19. (A) IV → II → III → I
Repurposing used cooking oil follows a precise sequence to ensure safety and sustainability. First, the oil quality is tested using specialized meters. Next, compliant establishments store the used oil in dedicated containers, which are subsequently collected by authorized aggregators. Finally, the aggregated oil is transported to facilities for conversion into biodiesel.

20. (C) Aaj Se Thoda Kam - Reducing salt, sugar, and fat intake
The national food regulator launched the Aaj Se Thoda Kam campaign as a public health initiative. It encourages citizens and food manufacturers to gradually reduce their consumption of salt, sugar, and saturated fats to prevent non-communicable

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diseases. Other initiatives, like RUCO, focus on converting degraded oil specifically into sustainable biodiesel fuel.

21. (A) To encourage citizens to reduce intake of salt, sugar, and fat.
The primary goal of the Aaj Se Thoda Kam initiative is to nudge citizens toward reducing their daily consumption of high fat, sugar, and salt. This behavioral change campaign seeks to address the rising national burden of obesity, hypertension, and other lifestyle-related non-communicable diseases through dietary awareness and food industry collaborations.

22. (D) I and III only
Partially hydrogenated vegetable oils are the primary source of industrial trans-fats, which are created when hydrogen is added to liquid oils to extend shelf life. The regulatory limits on trans-fats apply to both edible fats and the food products utilizing them, rather than enforcing a complete ban on all commercial oil manufacturing.

23. (B) DFS utilizes specific encapsulated forms of iron to prevent interaction with iodine.
Double fortified salt is designed to address both iodine deficiency disorders and iron-deficiency anemia simultaneously. To prevent chemical reactions between iodine and iron, which can cause discoloration and nutrient degradation, the formulation utilizes specialized encapsulated forms of iron. This ensures that both micronutrients remain stable and bioavailable in public distribution systems.

24. (A) Both A and R are true and R is the correct explanation of A.
Fortified rice is manufactured using advanced extrusion technology, where broken grains are ground into flour, mixed with micronutrients, and reshaped into kernels. This physical binding prevents the vitamins and minerals from dissolving or washing away, ensuring they remain highly stable during the intensive processes of domestic washing and cooking.

25. (D) Milk fortification is mandatory for all dairies operating in India.
According to the standards established by the regulator, liquid milk variants can be fortified with fat-soluble vitamins A and D. This fortification must not alter the natural sensory attributes of the milk, such as taste or colour. While highly encouraged and adopted by major brands, milk fortification remains a voluntary practice for dairies.

26. (A) P-III, Q-I, R-IV, S-II
FSSAI has developed specialized initiatives targeting diverse sectors to enhance nutrition and safety. Railway stations are certified under the Eat Right Station scheme, places of worship under BHOG, school canteens under the Eat Right School program, and clusters of street food vendors are recognized through the Clean Street Food Hub certification.

27. (B) Products intended to supplement the normal diet containing concentrated nutrients with physiological effects.
Health supplements are formally defined under national food regulations as products designed to supplement the standard daily diet. They contain concentrated sources of nutrients, botanicals, or other substances with nutritional or physiological benefits. These products are sold in dosage forms but are not intended to replace meals or act as drugs.

28. (C) Statement I is true but Statement II is false.
The Eat Right School programme utilizes a colour-coded system to classify foods based on their nutritional quality. Green indicates healthy foods, yellow represents foods to be eaten in moderation, and red denotes items high in fat, salt, and sugar. Red-category foods are strictly discouraged, not promoted, in school environments.

29. (A) II → I → IV → III
Implementing a behavior change campaign requires a structured, logical approach. It begins with a baseline survey to evaluate existing knowledge. This data is used to design contextual communication materials. Next, the messages are disseminated widely through media channels, and the process concludes with an evaluation of the overall impact on dietary habits.

30. (C) Prevention of neural tube defects
Adding specific micronutrients to staple foods directly addresses critical public health deficiencies. Folic acid is added to wheat flour and rice because adequate maternal intake is scientifically proven to reduce the occurrence of neural tube defects in infants. Other fortificants, like iron, are added to prevent widespread nutritional anemia.

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52. (C) I, II and III only
The hygiene rating audit evaluates several critical parameters to ensure safe food handling. Key criteria include safe water supply, handwashing facilities, personal hygiene of staff, medical fitness certifications, and strict temperature controls for high-risk foods. While general safety and pest control are examined, employing a licensed security guard is not a requirement.

53. (A) They must comply with FSSAI limits for heavy metals and toxic contaminants.
Health supplements and nutraceuticals are subject to strict regulatory standards under the food safety framework. These products must comply with specified limits for heavy metals, chemical residues, and microbiological contaminants. They are not permitted to contain narcotic drugs or be marketed as replacements for prescribed pharmaceutical therapies.

54. (A) Both A and R are true and R is the correct explanation of A.
Implementing the Eat Right Campus certification provides substantial benefits to corporate offices and universities. By systematically improving food safety standards and promoting nutritious diets, the initiative significantly reduces the transmission of foodborne infections. Consequently, this healthier environment enhances student and employee productivity, reducing absenteeism across the organization.

55. (B) SNP primarily targets the affluent urban population to address obesity.
The Special Nutrition Programme is a public welfare scheme designed to address malnutrition among vulnerable populations, particularly young children, pregnant women, and lactating mothers. Operating primarily through community Anganwadi centres, the program utilizes foods that must comply with safety standards and incorporates fortified staples to bridge nutritional gaps effectively.

56. (C) P-II, Q-III, R-IV, S-I
Food Safety Display Boards use distinct colour codes to signify the nature of different food businesses. Green is assigned to fruit and vegetable retail, red is utilized for meat and poultry shops, brown is designated for food manufacturing units, and yellow is specifically allocated to street food vendors to ensure clear consumer identification.

57. (D) Deliberately adding essential vitamins and minerals to food to improve its nutritional quality.
Food fortification is defined under national regulations as the scientific process of deliberately adding essential vitamins and minerals to staple foods. This intervention is designed to improve the nutritional quality of the food supply and deliver public health benefits with minimal risk, without altering the food's natural taste, appearance, or dietary consumption patterns.

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58. (C) Statement I is true but Statement II is false.
Under the RUCO guidelines, food business operators utilizing more than fifty litres of frying oil daily are required to maintain detailed usage logs. The aggregated used oil is strictly diverted to industrial units for conversion into eco-friendly biodiesel, and it is never purified or sold back for human culinary consumption.

59. (B) Eat Cheap
The Eat Right India movement is a comprehensive public health initiative built upon three core thematic pillars. These pillars are Eat Safe, which focuses on hygiene and food safety, Eat Healthy, promoting nutrition and fortification, and Eat Sustainable, emphasizing ecological food habits. Ensuring cheap food is not one of these core pillars.

60. (B) NetProFaN - A collaborative network of medical, health, and nutrition professionals.
NetProFaN is a professional network consisting of medical, nutrition, and health experts who support the regulator's wellness initiatives. The Food Fortification Resource Centre operates directly within FSSAI, while schemes like the Clean Street Food Hub and RUCO involve multi-stakeholder partnerships managed in close coordination with local state food safety authorities.

61. (A) Starch solution
The DART book outlines simple, low-cost testing methods designed for home use to detect common food adulterants. To verify the presence of iodine in common household salt, starch solution is utilized as a chemical indicator. The reaction between iodine and starch produces a distinct blue-purple colour change, confirming successful fortification.

62. (C) I, II, III and IV
Food Safety Display Boards are mandatory tools that must be displayed prominently by all

years. Before this period expires, the business must schedule a reassessment to verify continued compliance with food safety parameters.

42. (A) I, III and IV only
High consumption of fat, sugar, and salt is linked directly to non-communicable diseases. The regulator advocates for front-of-pack labels to inform consumers about these ingredients. While these foods are not completely banned from manufacture, campaigns like Aaj Se Thoda Kam encourage businesses to reformulate their products to lower these levels.

43. (B) FSSAI mandates that MDM kitchens must serve fortified staples to combat malnutrition.
To address nutritional deficiencies in growing children, the regulator mandates that Mid-Day Meal kitchens utilize fortified staple foods like double fortified salt, oil, and rice. These institutional kitchens are not exempt from safety standards and must maintain high hygiene and sanitation levels to ensure the meals served are completely safe.

44. (A) Both A and R are true and R is the correct explanation of A.
Fortifying refined vegetable oil with vitamin A is an effective public health intervention. Since vitamin A is chemically fat-soluble, the oil serves as an ideal and stable carrier. This natural lipid matrix protects the vitamin and significantly enhances its absorption and bioavailability within the human body during dietary consumption.

45. (A) The initiative focuses solely on the structural aesthetics of the station platforms.
The Eat Right Station initiative aims to ensure safe and healthy food for rail passengers. It evaluates platforms, retail kiosks, water vending machines, and catering units based on strict hygiene standards. The audit focuses deeply on food safety practices, waste management, and personal hygiene, rather than focusing on aesthetic platform designs.

46. (C) P-III, Q-I, R-IV, S-II
FSSAI initiatives are designed to achieve targeted safety and nutrition goals. The RUCO scheme prevents degraded cooking oil from re-entering the food chain, while the Clean Street Food Hub initiative upgrades vendor hygiene. Additionally, Eat Right Melas educate consumers through interactive events, and the SNF at Workplace scheme promotes corporate wellness.

47. (D) To transform the country's food system to ensure safe, healthy, and sustainable food.
The core vision of the Eat Right India movement is to comprehensively transform the country's food ecosystem. By aligning food safety with nutrition and environmental sustainability, the initiative empowers citizens to make informed choices and encourages food businesses to provide food that is safe for both human health and the planet.

48. (C) Statement I is true but Statement II is false.
Trans-fats can occur naturally in small amounts within meat and dairy products obtained from ruminant animals. However, the national campaign for a trans-fat free India is directed primarily at eliminating industrially produced trans-fats, which are created during chemical hydrogenation and pose severe risks to human cardiovascular health.

49. (B) II → I → III → IV
The systematic cycle of oil degradation under the RUCO framework begins with the repeated frying of edible oil at high temperatures. This thermal process generates elevated levels of total polar compounds. Once the limit is exceeded, the oil is discarded into aggregation containers and ultimately transported to manufacturing units to be converted into biodiesel.

50. (D) Rice - Fortified with Iron, Folic Acid, and Vitamin B_{12}
The national standards specify distinct fortificants for various dietary vehicles to combat malnutrition. Rice is fortified with a combination of iron, folic acid, and vitamin B12. Refined edible oils and milk are enriched with vitamins A and D, whereas salt is fortified with iodine and iron, providing a balanced approach to nutrient delivery.

51. (A) Food Safety Connect
The national food regulator launched the Food Safety Connect digital application to empower citizens. This portal allows consumers to easily verify the licensing status of food businesses, learn about safety standards, and file direct grievances regarding unhygienic practices or adulterated food products, ensuring rapid regulatory oversight and public participation.

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93. (A) It reduces non-communicable diseases among employees by promoting balanced diets.
The Eat Right Campus initiative in workplace environments plays an important role in employee wellness. By promoting balanced, nutritious meals in cafeterias and reducing access to unhealthy, high-fat, high-sugar options, the program helps lower the incidence of non-communicable diseases, thereby improving overall employee health and workplace productivity.

94. (A) Both A and R are true and R is the correct explanation of A.
When producing double fortified salt, iron and iodine can undergo chemical reactions that cause discoloration and deplete active iodine. To overcome this stability issue, manufacturers use encapsulated iron compounds. This encapsulation acts as a physical barrier, preventing direct contact between the elements and ensuring the nutrients remain stable over the product's shelf life.

95. (D) The elimination of PHOs is the primary mechanism to achieve the Trans-Fat Free India target.
Partially hydrogenated vegetable oils are created through industrial hydrogenation, historically used in products like vanaspati to extend shelf life. Because these oils contain high levels of trans-fats, the regulator actively discourages their usage. Phasing out these partially hydrogenated oils is a vital regulatory mechanism to achieve a trans-fat free food supply.

96. (C) P-IV, Q-III, R-II, S-I
The RUCO ecosystem operates through coordinated stakeholder responsibilities. Food business operators store used cooking oil and monitor polar compounds, while authorized aggregators collect this oil from various establishments. Next, biodiesel manufacturers chemically convert the waste oil into fuel, and the national regulator facilitates and regulates the entire sustainable network.

97. (B) By bringing railway catering under safe, healthy, and sustainable food practices.
The Eat Right Station initiative is aligned with the broader national movement by integrating railway catering into the food safety framework. It targets the massive transit population, ensuring that food served on platforms, in base kitchens, and on trains conforms to safe, healthy, and sustainable practices through rigorous auditing and grading.

98. (C) Statement I is true but Statement II is false.
The Clean Street Food Hub initiative provides essential training to street vendors regarding personal hygiene, pest control, and proper waste management. However, obtaining the certification does not eliminate the need for future oversight; local food safety authorities must conduct continuous surveillance and audits to maintain high hygiene standards.

99. (A) Enforcing penalties without prior notice for minor infractions.
The Social and Behaviour Change Communication strategy focuses on positive reinforcement. Its pillars include empowering consumers with verified safety information, nudging food businesses to comply voluntarily, and creating a culture of safety through mass media campaigns, rather than relying on enforcing harsh penalties without notice for minor infractions.

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100. (C) Refined Oil - Vitamin B and Vitamin C
The national standards specify distinct fortificants for various dietary vehicles. Salt is fortified with iodine and iron, wheat flour with iron, folic acid, and vitamin B12, and milk with vitamins A and D. However, refined oil is fortified with fat-soluble vitamins A and D, not water-soluble vitamins B and C.

101. (A) The oil is declared unfit and must be disposed of under the RUCO initiative.
When cooking oil is subjected to repeated frying and its total polar compounds reach thirty-five percent, it exceeds the safe limit of twenty-five percent. Under regulatory guidelines, this degraded oil is declared unfit for human consumption, must be discarded immediately, and should be disposed of through the RUCO initiative for biodiesel conversion.

102. (C) 140 Litres
To calculate the weekly contribution of used cooking oil under the RUCO initiative, the daily oil consumption is multiplied by the discard rate. A branch consuming one hundred litres daily and discarding twenty percent generates twenty litres of used oil per day. Over a seven-day week, this weekly contribution totals one hundred and forty litres.

food business operators. These boards feature color-coded designs specific to the business type, outline food handlers' hygiene duties, and empower consumers to make informed choices while providing a direct mechanism for registering feedback or complaints.

63. (D) It encourages integrating food safety and nutrition education into school curriculums.
The Eat Right School programme utilizes a colour-coded system to classify foods based on their nutritional quality. Green indicates healthy foods, yellow represents foods to be eaten in moderation, and red denotes items high in fat, salt, and sugar. Red-category foods are strictly discouraged, not promoted, in school environments.

64. (A) Both A and R are true and R is the correct explanation of A.
Enriching wheat flour with folic acid represents a vital public health strategy to combat birth defects. Folic acid is essential for cellular division and tissue growth, and adequate maternal consumption of this nutrient prior to and during early pregnancy is scientifically proven to reduce the risk of neural tube defects in newborns.

65. (B) The regulations limit trans-fats only in imported food products, exempting domestic manufacturers.
The regulations targeting the reduction and eventual elimination of industrial trans-fats apply equally to domestic food manufacturers and imported products. While trans-fats historically provided stability and shelf life, the national target to become trans-fat free requires food operators, bakeries, and traditional sweet makers to transition to healthier alternative fats.

66. (D) P-II, Q-III, R-I, S-IV
FSSAI implements targeted regulatory interventions to address various dietary issues and contaminants. Trans-fatty acids in commercial fats are restricted to under two percent, while iodine deficiency is addressed via double fortified salt. Additionally, used cooking oil degradation is managed through RUCO, and high sugar consumption is targeted with front-of-pack labeling.

67. (A) Campaign providing a 'Pink Book' to guide households on safe food storage and preparation.
Safe and Nutritious Food at Home is a consumer-focused campaign designed to inculcate safe food handling practices in households. The initiative utilizes the Pink Book as a comprehensive guide, offering practical tips on safe food storage, hygienic cooking methods, and nutrition, rather than enforcing inspections in private domestic kitchens.

68. (C) Statement I is true but Statement II is false.
The Hygiene Rating Scheme uses easily recognizable smiley icons to convey compliance levels to consumers. While a high number of smileys represents excellent standards, a low rating or zero smileys indicates that the food service operator has poor hygiene compliance and needs significant corrective actions, rather than requiring immediate structural demolition.

69. (A) Mandatory use of automated cooking systems for all street vendors.
To achieve certification as a Clean Street Food Hub, a vendor cluster must meet strict criteria. These include continuous access to safe potable water, proper waste disposal systems, and high standards of personal hygiene among food handlers. However, the mandatory use of expensive automated cooking systems is not a requirement for street vendors.

70. (D) FoSCoS - Online platform for licensing and registration of Food Businesses.
FoSCoS is the official online cloud-based platform launched by the national regulator to streamline the licensing and registration process for all food business operators. Other applications and platforms serve distinct purposes, such as facilitating consumer awareness, tracking food imports, or managing laboratory networks across the country.

71. (B) To provide simple tests to detect food adulterants at home.
The DART book, published by the national food regulator, is a practical guide designed for consumers. It stands for Detect Adulteration with Rapid Test, providing quick, chemical-free methods to identify common adulterants in daily foods like milk, oils, and spices using simple household ingredients, thereby enhancing consumer awareness and safety.

72. (C) I, II and IV only
The Eat Right Mela features educational pavilions, live demonstrations for detecting food adulteration, and interactive sessions with

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31. (B) 20
To qualify for the Clean Street Food Hub certification under the food safety framework, a cluster must consist of a minimum of twenty street food vendors. This group must adhere collectively to strict guidelines regarding potable water, waste management, personal hygiene, and safe food handling practices within the designated zone.

32. (C) I, III and IV only
Nutraceutical regulations stipulate that these products must provide physiological benefits and support general health. They are prohibited from claiming to cure or treat medical diseases. Their labels must clearly declare that they are not for medicinal use, and added nutrient levels must strictly conform to the Recommended Dietary Allowance.

33. (B) They contain the FSSAI license/registration number and a consumer grievance contact number.
Food Safety Display Boards are mandatory tools designed to display vital safety information and the establishment's registration details prominently to consumers. They provide a direct channel for filing grievances and are customized with distinct, color-coded layouts tailored specifically to the unique nature and requirements of different food sectors.

34. (C) A is true but R is false.
The national regulator collaborates extensively with non-governmental organizations and academic institutions to implement community-level health campaigns. This collaboration does not mean the regulatory authority lacks legal power; indeed, the regulator possesses full statutory power to enforce compliance and penalize violations under the Food Safety Act.

35. (A) Biodiesel produced from UCO contains harmful trans-fats released during combustion.
Converting degraded cooking oil into biodiesel through chemical transesterification is an environmentally sustainable process. This method reacts used lipids with alcohol, producing fuel that complies with national standards and valuable industrial glycerol. The resulting biodiesel burns cleanly and does not release harmful trans-fats or toxic emissions during combustion.

36. (C) P-II, Q-III, R-IV, S-I
The national regulator provides diverse digital and educational tools. The DART Book outlines simple home tests for food adulterants, while the Food Safety Connect portal manages consumer grievances. Additionally, the FFRC portal offers technical support for staple fortification, and the FoSTaC program oversees the training of certified safety supervisors.

37. (A) Diverting discarded cooking oil to non-food applications, specifically biodiesel.
In the Repurpose Used Cooking Oil initiative, the term repurpose specifically means collecting degraded oil that is no longer fit for human consumption and diverting it entirely to industrial applications. This process ensures that harmful, oxidized oils are safely converted into biodiesel rather than entering the food chain or polluting environment drains.

38. (C) Statement I is true but Statement II is false.
In the food fortification process, fortified rice kernels are blended with standard polished rice at a precise ratio, typically one to one hundred. These kernels are not consumed directly as pills. Regular washing is sufficient, and washing them vigorously with hot water is discouraged, as it can deplete soluble micronutrients.

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39. (B) I → III → IV → II
The Eat Right Campus certification is achieved through a systematic process. The campus administration first conducts a self-assessment to identify existing hygiene and nutritional gaps. Corrective actions are then implemented, followed by a formal third-party audit. Finally, the national regulator evaluates the report to award the official certification and grade.

40. (C) Orange Book - Food Safety at Workplace
The national regulator publishes specialized books to guide different sectors. The Orange Book is designed specifically to promote food safety and healthy dietary habits at the workplace. Other guides, like the Yellow Book, are meant for school canteens, while the Pink Book focuses on hygienic food preparation within home kitchens.

41. (C) 2 years
Once a food service establishment successfully undergoes an audit and meets the required safety standards, it is awarded a Hygiene Rating certificate. This rating is valid for a period of two

83. (A) It aims to systematically address micronutrient malnutrition in school children.
Integrating fortified staples into the Mid-Day Meal scheme is a targeted public health strategy to address micronutrient malnutrition among school-age children. This systematic approach ensures that kids receive essential vitamins and minerals through daily school meals, utilizing fortified rice, oils, and double fortified salt in compliance with national safety standards.

84. (A) Both A and R are true and R is the correct explanation of A.
Converting degraded cooking oil into biodiesel provides notable environmental benefits under the RUCO scheme. By establishing systematic collection channels, the initiative prevents food businesses from disposing of waste oil into municipal drains, which causes clogging. Furthermore, utilizing biodiesel as an alternative fuel substantially reduces carbon emissions.

85. (A) Compliant food items are exempt from displaying the mandatory FSSAI license.
The initiative to reduce salt, sugar, and fat involves collaborating with food businesses to reformulate packaged products and promoting clear nutritional labeling. However, reformulating products does not exempt any food business operator from the mandatory requirement of displaying a valid FSSAI license or registration number on their product packaging.

86. (D) P-II, Q-III, R-I, S-IV
FSSAI programs are aligned with distinct operational philosophies. The Eat Safe pillar focuses on ensuring personal and environmental hygiene, while Eat Healthy promotes dietary diversity and fortification. Additionally, Eat Sustainable targets the reduction of carbon footprints and food waste, and the RUCO initiative represents a sustainable circular economy approach.

87. (B) The food contains industrial trans-fats of not more than 0.2g per 100g of food.
The trans-fat free logo is a voluntary declaration that food establishments and manufacturers can display. It indicates that the food product contains industrial trans-fats at levels not exceeding 0.2 grams per 100 grams of the food, assuring consumers of minimal exposure to these harmful lipids.

88. (A) Both Statement I and Statement II are true.
The Special Nutrition Programme provides essential supplementary nutrition to vulnerable mothers and young children through local Anganwadi centres. The national regulator plays a critical role in this welfare initiative by prescribing strict food safety, quality, and hygiene standards, while recommending the mandatory inclusion of fortified staples in the distributed rations.

89. (D) It guarantees a 100% discount on food bills if the rating is below 3 stars.
The Hygiene Rating System is designed to benefit consumers by providing clear transparency regarding the sanitary conditions of food service establishments, building trust, and encouraging informed choices. While it nudges businesses to improve hygiene, the scheme does not regulate commercial pricing or offer discounts based on the rating achieved.

90. (A) Luggage Handling - Must be sanitized using ultraviolet irradiation hourly
Under the Eat Right Station audit, criteria focus strictly on food safety parameters. This includes verifying that water vending machines comply with potable standards, retail kiosks display valid licenses, and base kitchens undergo hygiene audits. Sanitizing general passenger luggage with ultraviolet irradiation hourly is not a requirement of this food safety audit.

91. (B) Encapsulated ferrous sulphate or ferrous fumarate
To formulate double fortified salt, FSSAI mandates using encapsulated forms of iron, such as ferrous sulphate or ferrous fumarate. This encapsulation provides a crucial protective barrier that prevents chemical interactions between iron and iodine, ensuring both micronutrients remain stable during storage and are effectively absorbed by the human body upon consumption.

92. (B) I, III and IV only
FSSAI's digital outreach utilizes social media to dispel dietary myths, the FFRC portal to provide technical guidelines, and FoSTaC e-learning modules for supervisor training. While these digital tools enhance public education and facilitate business compliance, they do not replace the physical inspections conducted by authorized Food Safety Officers.

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nutrition experts. To align with public health goals, the event strictly discourages the promotion or sale of highly processed, high-fat, high-sugar foods, focusing instead on safe, nutritious, and sustainable dietary choices.

73. (D) It aligns efforts of government, partners, and industry to promote fortification.
The Food Fortification Resource Centre operates as a specialized promotional and technical hub under the regulator. Rather than functioning as a commercial business, it works to align the efforts of government departments, developmental partners, and the food industry to scale up the fortification of staple foods in public safety nets.

74. (A) Both A and R are true and R is the correct explanation of A.
Under the national regulations, the plus F logo is mandatory on the packaging of any food product that claims to be fortified. This specific logo acts as a trusted quality seal, assuring consumers that the product contains the required micronutrients in scientifically validated, safe, and effective quantities to combat malnutrition.

75. (B) The certification guarantees that the food provided on campus is entirely free of cost.
The Eat Right Campus program certifies academic, corporate, and healthcare institutions that maintain high standards of food safety, promote balanced nutrition, and adopt sustainable practices. While it ensures that the food served is hygienic and healthy, the certification does not regulate prices or mandate that food must be served free of cost.

76. (B) P-III, Q-I, R-II, S-IV
Micronutrients added during food fortification play vital biological roles in the human body. Iodine is essential for thyroid hormone synthesis, preventing endemic goitre. Iron is crucial for hemoglobin production to prevent nutritional anemia. Additionally, vitamin D facilitates calcium absorption for bone health, while vitamin A is vital for maintaining healthy vision.

77. (A) A cluster of 20 or more vendors selling safe, hygienic food in a marked zone.
FSSAI defines a Clean Street Food Hub as a designated geographical cluster containing twenty or more street food vendors. These vendors must collectively meet strict criteria regarding food preparation hygiene, garbage disposal, potable water access, and customer service, transforming local street food zones into popular, safe, and clean dining areas.

78. (C) Statement I is true but Statement II is false.
Fortified rice kernels are produced using extrusion technology, where rice flour is blended with vitamins and minerals and shaped into grains. These kernels are then blended with regular rice, usually at a one to one hundred ratio, for daily dietary consumption, rather than being eaten directly as separate medicinal pills.

79. (D) Broadcasting false claims to induce fear of unfortified foods.
FSSAI deploys diverse, scientifically backed methods to build public awareness, including community walkathons, social media campaigns, and interactive mascots like Master Sehat. The regulator focuses strictly on positive reinforcement, education, and voluntary compliance, and does not broadcast misleading claims or induce fear regarding non-fortified foods among the consumer public.

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80. (C) DART Book - Guidelines for prescribing Nutraceuticals
The publications issued under the Eat Right initiative are designed for specific targets. The Pink Book is for home safety, the Yellow Book is for schools, and the Orange Book is for workplaces. The DART Book, however, is a consumer guide for detecting household food adulterants, not a manual for prescribing medical nutraceuticals.

81. (B) TPC Meter
To monitor oil quality and prevent the consumption of degraded fats, the regulator recommends using a portable TPC meter. This electronic device provides food service operators with rapid, on-site measurements of total polar compounds in frying oil, allowing them to determine accurately when the oil has reached its safe operational limit.

82. (D) I, II and IV only
The Eat Right India movement is a collaborative initiative that partners with civil society organizations, professional networks like NetProFaN, and academic institutions to drive awareness and research. The food industry is also actively engaged to encourage voluntary reformulation of products, rather than being excluded from participation in the program.

103. (B) FBOs must meet specific micronutrient levels in FSS regulations to use the +F logo.
Food business operators are permitted to use the plus F logo only if they meet the specific micronutrient levels prescribed in the fortification regulations. The logo cannot be applied voluntarily without testing; indeed, businesses must maintain strict quality control records and laboratory verification to ensure the products are properly fortified.

104. (C) Mandate a central RO plant or safe potable water provision before certifying.
Safe potable water is a mandatory requirement for achieving the Clean Street Food Hub certification. If vendors rely on untreated groundwater during the pre-audit, the administration must mandate installing a central reverse osmosis plant or providing another safe potable water source before the cluster can be officially certified as a hygienic hub.

105. (D) They are regulated under the same category and strictures as Schedule H pharmaceutical drugs.
Health supplements and nutraceuticals are designed to supplement the diet and must not claim to cure specific diseases. They are formulated using permitted botanical, mineral, or biological ingredients. While subject to strict quality standards, they are regulated under food safety laws rather than under the strictures of prescription pharmaceutical drugs.

106. (A) The Yellow Book
When advising a school administration on implementing the Eat Right School program, the Yellow Book is the primary resource to recommend. This manual is designed for school environments, providing teachers, parents, and canteen staff with practical guidelines to promote food safety, personal hygiene, and healthy eating habits among children.

107. (B) Vitamin D integrates well with milk's fat content, improving calcium absorption.
Milk is an ideal vehicle for vitamin D fortification because this vitamin is fat-soluble and integrates seamlessly with the natural fat content of milk. Furthermore, vitamin D plays a biological role in enhancing the absorption of calcium, which is naturally abundant in milk, thereby supporting bone health in the population.

108. (D) Statement I is false but Statement II is true.
Food Safety Display Boards must be placed in prominent areas where they are easily visible to consumers. These boards contain essential, easy-to-understand instructions regarding safe food handling practices, temperature controls, and personal hygiene standards tailored specifically to the unique operational requirements of the respective food business sector.

109. (A) Setting maximum retail prices (MRP) for all fortified food commodities.
The Food Fortification Resource Centre is a technical and promotional hub designed to foster fortification across the country. It assists the food industry with technical support, builds consumer awareness, and encourages states to adopt fortified staples in welfare schemes, but it does not have the authority to regulate commercial retail prices.

110. (C) TPC at 40% - Permitted for frying only in unorganized sectors
The regulatory limit for total polar compounds in frying oil is set strictly at twenty-five percent. Any oil with polar compound levels exceeding this threshold is deemed degraded and unfit for frying in both organized and unorganized food sectors, and must be disposed of for industrial biodiesel production under the RUCO initiative.

111. (D) Decline in cardiovascular diseases caused by industrial trans-fats.
Eliminating partially hydrogenated oils from the commercial food supply removes the primary source of industrial trans-fats. Since these trans-fats are linked to elevated low-density lipoprotein levels and arterial clogging, their complete removal from the food chain directly leads to a significant decline in the incidence of cardiovascular diseases.

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112. (C) Ensuring Schedule 4 compliance, FoSTaC staff training, and hiring a supervisor.
To achieve the highest hygiene rating, a food establishment must prioritize operational safety. This involves ensuring strict compliance with Schedule Four hygiene requirements, providing certified training to food handlers through the FoSTaC program, and appointing a qualified food safety supervisor to oversee daily kitchen operations and maintain clean facilities.

113. (B) Supplementary food composition is standardized based on target demographic needs. Under the Special Nutrition Programme, the nutritional composition of the supplementary food distributed is carefully standardized to meet the specific physiological needs of target demographics, such as infants, pregnant women, and lactating mothers. These distributed foods are subject to national quality, safety, and labeling standards to ensure safety.

114. (D) Eat Healthy and Eat Sustainable
By serving meals high in fat, salt, and sugar while neglecting proper waste segregation, the corporate campus canteens are failing to promote balanced dietary habits and ecologically sound practices. Therefore, they are failing to meet the core criteria of both the Eat Healthy and Eat Sustainable pillars of the movement.

115. (A) The process removes toxins, making the biodiesel safe for human consumption.
Chemical transesterification converts used cooking oil into biodiesel by reacting lipids with alcohol. While this process effectively refines the oil into an eco-friendly fuel and produces valuable industrial glycerol, the resulting biodiesel is strictly an industrial fuel product and is highly toxic and unsafe for any form of human consumption.

116. (C) Prevention of food cross-contamination
Reusing the same cloth to wipe down raw meat blocks and cooked food counters represents a severe violation of basic sanitation principles. This practice introduces high risks of food cross-contamination by transferring pathogens from raw animal products to ready-to-eat foods, requiring immediate corrective action and training on separate cleaning protocols.

117. (A) Using vernacular media, street plays, and community health workers.
To implement a successful behavior change campaign in rural and semi-urban areas, communication must be highly accessible. Utilizing local vernacular media, engaging street plays, and community health workers is the most effective strategy to bridge literacy barriers, deliver practical safety messages, and encourage voluntary adoption of hygienic food habits.

118. (C) Statement I is true but Statement II is false.
The national regulator collaborates closely with academia to conduct risk assessments, gather scientific data, and formulate robust food safety standards. Far from being barred, academic institutions are actively encouraged to participate in consumer awareness campaigns, leveraging their educational networks to spread messages about nutrition and safe food habits.

119. (B) Protocols for diagnosing and clinically treating severe food allergies.
The Orange Book is a specialized resource guide designed to promote safe and healthy eating habits in workplace canteens. It provides protocols for organizing healthy meetings and templates for auditing office canteens, but it does not contain clinical medical guidelines for diagnosing or treating food allergies, which remain under medical purview.

120. (C) Mandatory 100% organic farming - Targeted by 2025 across all Indian states
The national regulator has successfully enforced a two percent trans-fat limit across all edible oils, aiming for a trans-fat free food supply. While the government actively promotes organic farming through various agricultural schemes, there is no mandatory regulation requiring one hundred percent of national farming to transition to organic by 2025.

121. (D) Reduction in instances of foodborne illnesses among school children.
Imparting comprehensive food safety and hygiene training to cooks and helpers in Mid-Day Meal kitchens through the FoSTaC program ensures safe food handling. This targeted capacity building leads directly to a substantial reduction in the contamination of school meals, protecting children from the risks of foodborne infections and outbreaks.

122. (A) Aggregators collecting UCO from FBOs and delivering it to biodiesel plants.
To establish an effective collection network under the RUCO initiative, the logistical link between food businesses, aggregators, and manufacturers is essential. Authorized aggregators must systematically collect used cooking oil from various food service establishments and safely transport it to designated industrial plants for chemical conversion into biodiesel.

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123. (B) It requires FBOs to maintain records of fortificant procurement and quality tests.
Utilizing the plus F logo on product packaging is subject to strict regulatory compliance. Food business operators must maintain detailed records of fortificant procurement, quality control tests, and internal laboratory verification. The logo cannot be used merely for naturally occurring nutrients and must be placed clearly on the package.

124. (B) Improper blending machinery or inadequate mixing leading to non-homogeneity.
When laboratory tests show inconsistent micronutrient levels across different batches of blended rice, the variation is usually caused by an operational mixing failure. Utilizing improper blending machinery or inadequate mixing processes prevents the fortified rice kernels from being distributed evenly, resulting in non-homogeneous batches that fail quality checks.

125. (A) It mandates a completely vegan diet for all corporate canteens.
The SNF at Workplace initiative aims to promote healthy dietary environments for employees by encouraging corporate canteens to undergo certification. While it utilizes the Orange Book to guide campuses on providing safe, balanced, and sustainable meals, the initiative does not mandate a completely vegan diet for corporate canteens.

126. (C) The CoA of the fortificant premix and the lab test reports of the final flour.
To verify compliance at a wheat flour fortification facility, an officer must check specific records. The manufacturer must provide the Certificate of Analysis of the fortificant premix to verify its quality, alongside laboratory test reports of the final blended flour to confirm that the nutrients conform to the mandated standards.

127. (D) To educate citizens about safe, healthy, and sustainable diets via an engaging event.
The primary goal of organizing a regional Eat Right Mela is to educate citizens about food safety, balanced nutrition, and sustainable dietary practices. By using an engaging infotainment format with interactive stalls, live food tests, and expert talks, the event effectively promotes healthy lifestyles and behavioral changes at the grassroots level.

128. (C) Statement I is true but Statement II is false.
The Food Safety Connect digital application serves as an interactive platform that empowers consumers to report unhygienic conditions or food safety violations directly to the regulator. This feedback mechanism is available for all registered food businesses, from local street vendors to large restaurants, and is not restricted to luxury hotels.

129. (B) Unencapsulated elemental iron filings
Under the national regulations, approved iron fortificants for double fortified salt include encapsulated ferrous sulphate, encapsulated ferrous fumarate, and food-grade ferric pyrophosphate. Using unencapsulated elemental iron filings is strictly prohibited, as raw metallic iron reacts chemically with iodine and causes severe discoloration and degradation of the salt product.

130. (D) Eat Right Station - Airport Authority of India
FSSAI initiatives are designed for specific target environments and stakeholders. The Eat Right School program targets students and teachers, the Clean Street Food Hub works with street vendors, and the RUCO initiative connects biodiesel plants with large food businesses. The Eat Right Station initiative, however, targets railway stations, not airport authorities.

131. (A) Hypervitaminosis and potential toxicity.
Prolonged consumption of certain health supplements that contain fat-soluble vitamins, such as vitamins A and D, at levels significantly exceeding the daily Recommended Dietary Allowance can lead to bodily accumulation. This excessive build-up can cause hypervitaminosis and potential clinical toxicity, as fat-soluble vitamins are stored in body tissues rather than excreted.

132. (C) Red border with raw meat handling and cross-contamination prevention rules.
Food Safety Display Boards are customized with specific color-coded borders to match distinct sectors. For a meat and poultry retail shop, the board must feature a red border. This display outlines critical hygiene instructions, such as safe raw meat handling, temperature controls, and the prevention of food cross-contamination in the shop.

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133. (A) FFRC conducts training and workshops for FBOs to standardize fortification.
The Food Fortification Resource Centre plays a vital role in capacity building by conducting specialized technical training, workshops, and seminars for food business operators. These educational efforts are designed to standardize the fortification process, resolve operational challenges for millers, and ensure consistent compliance with the mandated national nutrient standards.

134. (D) Non-compliant, as milk must contain both Vitamin A and D for +F status.
Under the national fortification regulations, liquid milk utilizing the plus F logo must be fortified with both vitamin A and vitamin D within the prescribed limits. Adding only one of these vitamins fails to meet the standard, rendering the processing plant non-compliant and ineligible to display the logo on its milk packaging.

135. (B) Pests and rodents are permitted in storage areas if food is packed in plastic.
To achieve the Eat Right Station certification, all participating food premises must maintain strict sanitary conditions. This includes ensuring proper waste segregation, providing certified training to food handlers, and displaying valid registrations. Permitting pests or rodents in food storage areas is a severe compliance failure, regardless of the packaging material used.

136. (C) Reject the label, as nutraceuticals cannot make disease-curing claims.
Under the food safety regulations, nutraceuticals and dietary supplements are classified as foods, not pharmaceutical drugs. Their labels are prohibited from claiming to prevent, mitigate, cure, or treat any human disease. Therefore, an officer must reject any label making disease-curing claims, as such claims mislead consumers and violate advertising rules.

137. (D) Sustained safety requires voluntary hygiene by handlers and informed consumer choices.
Behavioral change is crucial in the food safety framework because lasting improvement cannot be achieved through legal enforcement alone. Ensuring a safe food ecosystem requires food handlers to adopt hygienic habits voluntarily and consumers to make informed, healthy dietary choices, which is why the regulator prioritizes social communication campaigns.

138. (C) Statement I is true but Statement II is false.
Non-governmental organizations play a supportive role in food safety by conducting community-level awareness campaigns and promoting healthy eating. However, the authority to enforce food safety regulations and conduct statutory inspections remains the exclusive legal responsibility of the state food safety department, and cannot be delegated or transferred to private organizations.

139. (B) Promoting plant-based meat alternatives to save the environment.
The Eat Safe pillar focuses on fundamental hygiene and sanitation measures to prevent foodborne diseases. Key actions include maintaining high personal hygiene, ensuring proper thermal cooking and holding temperatures, and keeping food covered to protect it from pests. Promoting plant-based meat alternatives falls under the Eat Sustainable pillar rather than Eat Safe.

140. (B) DART Book - Heavy Machinery Operators
The manuals published by the regulator target specific audiences to promote safety. The Pink Book is designed for homemakers, the Yellow Book for school administrations, and the Orange Book for corporate employees. The DART Book, however, is a guide for everyday consumers to detect food adulterants, not a manual for machinery operators.

141. (A) Using opaque pouches, tins, or dark bottles to prevent light exposure.
Since vitamin A is highly sensitive to light and prone to photodegradation, protecting the nutrient during storage is crucial. To maintain the stability of vitamin A in fortified edible oil, the regulator recommends using opaque packaging materials, such as colored pouches, tin containers, or dark bottles, which prevent exposure to direct light.

142. (C) Cutting added sugar by 15% and using whole wheat instead of refined flour.
A bakery can align with the healthy reformulation initiative by systematically reducing the levels of critical ingredients. Cutting added sugar by fifteen percent and replacing refined flour with whole wheat flour represents a direct, practical commitment to lowering high fat, sugar, and salt levels, thereby providing healthier dietary options to consumers.

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143. (D) It must comply with BIS specifications for Biodiesel (IS 15607).
The biodiesel produced by chemically converting used cooking oil under the RUCO initiative must meet strict quality parameters. To ensure safety and performance, this fuel must comply with the Bureau of Indian Standards specifications for biodiesel, specifically IS 15607, before it can be blended with standard petroleum diesel for commercial use.

144. (C) The station fails, as the base kitchen is critical to the safety ecosystem.
Under the Eat Right Station evaluation framework, the entire catering ecosystem is audited as a single unit. Because the base kitchen supplies food to retail stalls, any major hygiene failure or pest infestation in the kitchen compromises passenger safety, resulting in a failure to achieve the station certification until corrective actions are taken.

145. (B) The scheme is primarily designed to assess heavy chemical manufacturing units.
The Hygiene Rating Scheme is designed for food service establishments, such as restaurants, cafes, caterers, and sweet shops, that possess a valid FSSAI license or registration. The scheme is not designed to assess industrial chemical manufacturing plants, which do not fall under the purview of retail food hygiene rating audits.

146. (D) One Recommended Dietary Allowance (1 RDA)
According to the regulatory standards for health supplements and nutraceuticals, the quantity of vitamins and minerals added to these formulations must be safe. To prevent risk of toxicity, the added amount of any nutrient must not exceed the standard limit of one Recommended Dietary Allowance per day for the target demographic.

147. (A) Shifting from rigid regulation to self-compliance and empowering citizens.
The holistic vision of the Eat Right India movement is to transform the national food system by shifting from a rigid regulatory model to a collaborative approach. By encouraging self-compliance among food businesses and empowering citizens with nutritional awareness, the initiative fosters a self-sustaining culture of food safety and healthy habits nationwide.

148. (C) Statement I is true but Statement II is false.
FSSAI works closely with the food industry to encourage voluntary reformulation of products, helping businesses phase out trans-fats and lower sodium levels. However, the food industry is not restricted to purchasing fortificants from the regulator, and can source premixes from any certified commercial supplier meeting the mandated quality standards.

149. (A) The hub must have a centralized air-conditioning system for open-air stalls.
To achieve certification as a Clean Street Food Hub, a vendor cluster must meet essential sanitary standards, such as displaying Food Safety Display Boards, ensuring clean water access, and using covered garbage bins. However, installing a centralized air-conditioning system for open-air street stalls is not required for the hygiene certification.

150. (D) Eat Fast - Encouraging the consumption of ultra-processed instant meals
The Eat Right India movement is structured around three core pillars: Eat Safe focuses on hygiene, Eat Healthy promotes balanced diets and fortification, and Eat Sustainable emphasizes local foods and reducing waste. Promoting the rapid consumption of ultra-processed instant meals is not a pillar, as it directly contradicts the movement's health goals.

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competency to issue the prohibition order for up to one year?
(A) The Designated Officer of the concerned district
(B) The Adjudicating Officer
(C) The Commissioner of Food Safety
(D) The Food Safety Officer of the nodal district

15. What is the direct effect of having a decentralized food safety enforcement structure at the state level?
(A) Frequent and systemic contradiction of uniform national safety guidelines by state enforcement bodies.
(B) Complete elimination of the mandatory requirement to obtain a central license from the federal authority.
(C) Automated collection and testing of food samples without any physical intervention from human officers.
(D) Enhanced capacity to manage localized foodborne outbreaks and regional market adulterations.

16. Who is the statutory authority responsible for appointing the Designated Officer for each district within a state?
(A) The Chief Executive Officer of FSSAI
(B) The District Magistrate
(C) The Commissioner of Food Safety
(D) The State Health Minister

17. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): A Designated Officer has the authority to sanction prosecutions for offences punishable with fine only.
Reason (R): The Designated Officer serves as the primary licensing authority for state-level food businesses.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

18. Which of the following statements correctly outlines a function of the Designated Officer under the Food Safety and Standards Act?
(A) The Designated Officer is authorized to draft and gazette new food standards for their specific district.
(B) The Designated Officer conducts routine day-to-day physical inspections of small street food vendors.
(C) The Designated Officer officially appoints Food Safety Officers for their designated local jurisdiction.
(D) The Designated Officer receives the report of the Food Analyst and decides whether to launch prosecution.

19. A Food Safety Officer discovers that a local manufacturing unit is using prohibited synthetic colors. Before launching a prosecution against the manufacturer in the court of law, whose written sanction must the Food Safety Officer obtain?
(A) The Designated Officer
(B) The Food Analyst
(C) The Adjudicating Officer
(D) The Sub-Divisional Magistrate

20. Match the following sections of the FSS Act, 2006 to the respective officials in List II.
List I: (Sections of the FSS Act, 2006)
P. Section 36
Q. Section 37
R. Section 68
S. Section 30
List II: (Officials)
I. Adjudicating Officer
II. Commissioner of Food Safety
III. Designated Officer
IV. Food Safety Officer
(A) P-III, Q-IV, R-I, S-II
(B) P-IV, Q-III, R-II, S-I
(C) P-III, Q-I, R-IV, S-II
(D) P-II, Q-III, R-I, S-IV

21. Identify the incorrect statement regarding the responsibilities of a Designated Officer.
(A) They have the sole authority to permanently ban a food product nationwide.
(B) They investigate complaints made against Food Safety Officers.
(C) They are responsible for issuing and cancelling licenses of food business operators.
(D) They maintain a record of all inspections made by Food Safety Officers in their jurisdiction.

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(C) The Commissioner sanctions prosecutions for offences punishable with imprisonment under the Act.
(D) The Commissioner is empowered to independently amend the national standards set by the FSSAI to suit state requirements.

7. Consider the following statements regarding the structure of the State Food Authority:
I. The Food Safety Officer operates under the administrative control of the Designated Officer.
II. The Designated Officer must be a whole-time officer, not below the rank of a Sub-Divisional Officer.
III. The Adjudicating Officer is appointed by the Food Safety Officer for district-level hearings.
IV. State Food Testing Laboratories function under the administrative purview of the Commissioner of Food Safety.
Which of the above statements is/are correct?
(A) I, II, and III only
(B) I, II, and IV only
(C) II, III, and IV only
(D) I, III, and IV only

8. All of the following are primary statutory functions of the Commissioner of Food Safety EXCEPT:
(A) Undertaking training programmes for personnel of the department
(B) Ensuring an efficient and uniform implementation of the standards
(C) Issuing Central Licenses to large-scale food business operators
(D) Approving prosecution processes for severe food safety violations

9. Identify the correct pair regarding the officials and their governing sections under the Food Safety and Standards Act, 2006.
(A) Designated Officer – Section 38
(B) Food Safety Officer – Section 36
(C) Adjudicating Officer – Section 31
(D) Commissioner of Food Safety – Section 30

10. Read the given statements and select the correct option.
Statement I: The legislative framework of food safety relies heavily on the cooperative federalism model.
Statement II: The Central Government drafts the rules and regulations, while the State Governments are solely responsible for setting food product standards.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

11. Arrange the following food safety enforcement authorities in the correct hierarchical sequence from the highest state-level authority to the grassroots enforcement level.
1. Food Safety Officer
2. Commissioner of Food Safety
3. Designated Officer
4. Joint Food Safety Commissioner
(A) 2, 4, 3, 1
(B) 2, 3, 4, 1
(C) 4, 2, 3, 1
(D) 2, 1, 3, 4

12. Identify the incorrect pair regarding the official and their specific role in the State Food Authority structure.
(A) Food Safety Officer – Draws samples of food items
(B) Food Analyst – Adjudicates penalties for unsafe food
(C) Designated Officer – Issues state-level food licenses
(D) Commissioner of Food Safety – Prohibits food sale during emergencies

13. What is the most appropriate rationale for granting food safety concurrent jurisdictional status under the Indian Constitution?
(A) To ensure uniform national standards while enabling localized enforcement and rapid emergency response.
(B) To allow state governments to generate additional revenue through independent taxation of food businesses.
(C) To prevent federal authorities from interfering in agricultural practices and local production policies.
(D) To shift the entire administrative and financial burden of operating public food laboratories to panchayats.

14. The State Government wishes to ban the sale of a specific brand of instant noodles due to the presence of heavy metals exceeding permissible limits. Which authority possesses the statutory

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site to minimize administrative delay.

(D) Grant an official, fully approved Central License to the transport vehicle owner.

30. Cause: A district lacks a full-time appointed Designated Officer for six months.
Effect: Which of the following is the most direct consequence?

(A) The district immediately loses its official administrative representation in the Central Advisory Committee.

(B) All designated public food testing laboratories in the state are forced to shut down indefinitely.

(C) The processing of state-level licenses and sanctioning of new prosecutions encounter severe administrative delays.

(D) Active district Food Safety Officers are automatically promoted to the rank of acting Designated Officers.

31. Under the Food Safety and Standards Rules, into how many parts must a Food Safety Officer divide a food sample taken for analysis?

(A) Two parts

(B) Three parts

(C) Four parts

(D) Five parts

32. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): A Food Safety Officer can enter and inspect any place where food is manufactured or stored at any reasonable time.
Reason (R): The FSO must obtain a search warrant from a Judicial Magistrate prior to every routine inspection.

(A) Both A and R are true and R is the correct explanation of A.

(B) Both A and R are true but R is not the correct explanation of A.

(C) A is true but R is false.

(D) A is false but R is true.

33. Which of the following statements correctly details the procedure followed by an FSO after drawing a food sample?

(A) One part is sent to the Food Analyst, and three parts are sent to the Commissioner of Food Safety.

(B) One part is sent to the Food Analyst, two parts to the Designated Officer, and one part is kept by the FBO.

(C) Two parts are sent to the Food Analyst, and two parts are kept by the FSO for personal reference.

(D) One part is sent to the Food Analyst, two parts are sent to the Designated Officer, and one part is sent to the Referral Laboratory immediately.

34. An FSO wishes to seize a batch of adulterated spices that are prone to rapid spoilage. Which concept dictates the protocol for handling perishable seized food?

(A) The food products must be treated with chemical preservatives and transferred to a designated laboratory within twelve hours.

(B) The food samples must be dispatched to the nearest National Reference Laboratory for comprehensive evaluation within one day.

(C) The food articles must be transferred to the local police department for long-term storage until the trial is finalized.

(D) The FSO can destroy the perishable food immediately if it is unfit for human consumption, after recording formal evidence.

35. Match the parts of a divided food sample in List I to their respective destinations as per standard operating procedures in List II.
List I: (Parts of a divided food sample)
P. First part
Q. Second and Third parts
R. Fourth part
List II: (Destinations)
I. Retained for sending to the Referral Laboratory if requested
II. Sent to the Food Analyst under intimation to the Designated Officer
III. Sent to the Designated Officer for safe custody

(A) P-II, Q-III, R-I

(B) P-I, Q-II, R-III

(C) P-III, Q-I, R-II

(D) P-II, Q-I, R-III

36. Identify the incorrect statement regarding the powers of a Food Safety Officer.

(A) The FSO can seize any article of food which appears to be in contravention of the FSS Act.

(B) The FSO has the power to search any premises where they have reason to believe

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22. Consider the following statements regarding the appointment and jurisdiction of Food Safety Officers (FSOs):
I. FSOs are appointed by the Commissioner of Food Safety by notification.
II. A person can be appointed as an FSO even if they have a financial interest in a food business.
III. FSOs must possess a degree in Food Technology, Dairy Technology, or related prescribed fields.
IV. The local area of jurisdiction for an FSO is assigned by the Commissioner of Food Safety.
Which of the above statements is/are correct?
(A) I, II, and III only
(B) I, III, and IV only
(C) II, III, and IV only
(D) I and IV only

23. All of the following are statutory duties and powers of the Designated Officer EXCEPT:
(A) Issuing, suspending, or cancelling licenses for regional food businesses
(B) Conducting physical and chemical analysis of food samples in laboratories
(C) Sanctioning criminal or civil prosecution for specific regulatory offences
(D) Investigating formal complaints filed against active Food Safety Officers

24. Identify the correct pair regarding the administrative accountability of officials.
(A) Food Safety Officer – Accountable to the Food Analyst
(B) Commissioner of Food Safety – Accountable to the Adjudicating Officer
(C) Designated Officer – Accountable to the Commissioner of Food Safety
(D) Adjudicating Officer – Accountable to the District Magistrate solely

25. Read the given statements and select the correct option.
Statement I: The Designated Officer is exclusively responsible for the collection of food samples from local markets.
Statement II: The Food Safety Officer acts under the supervision and control of the Designated Officer.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

26. A Designated Officer receives a laboratory report from the Food Analyst indicating that a sampled batch of packaged milk is "sub-standard" but not "unsafe." Based on this report, what is the appropriate course of action for the Designated Officer?
(A) Recommend the matter to the Adjudicating Officer for imposing a financial penalty.
(B) Direct the Food Safety Officer to file a criminal case before the Judicial Magistrate.
(C) Immediately sentence the Food Business Operator to imprisonment.
(D) Discard the report as sub-standard food is legally permitted to be sold.

27. Identify the incorrect pair regarding the qualifications and constraints of enforcement officials.
(A) Food Safety Officer – Must not possess any financial interest in local food businesses
(B) Commissioner of Food Safety – Must hold a doctorate degree in food microbiology
(C) Designated Officer – Must be a whole-time official appointed by the state authority
(D) Food Analyst – Must satisfy the strict technical and academic criteria of FSSAI

28. What is the primary administrative accountability of the Designated Officer at the district level?
(A) Ensuring that all central licensing applications in the district are processed and issued without delay.
(B) Directing the uniform implementation of safety standards and supervising Food Safety Officers in the district.
(C) Generating additional tax revenue for the municipal administration by collecting fines from local food vendors.
(D) Managing the daily technical operations and quality control of the District Food Testing Laboratory.

29. A Food Safety Officer intercepts a vehicle carrying misbranded food products. After seizing the items, what immediate competency must the FSO demonstrate to proceed legally?
(A) Notify the Designated Officer and keep the seized food items in secure custody.
(B) Organize an immediate public auction to sell the confiscated products to locals.
(C) Dispose of and destroy all seized items on-

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CHAPTER 33
Role of State Food Authorities

1. Under which list of the Seventh Schedule of the Indian Constitution is the subject of "adulteration of foodstuffs and other goods" placed, granting both Parliament and State Legislatures the power to enact laws?
(A) Union List
(B) Concurrent List
(C) State List
(D) Residuary List

2. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): The Commissioner of Food Safety is responsible for the efficient implementation of food safety standards across the state.
Reason (R): The Commissioner of Food Safety is appointed by the Central Government under the recommendation of the FSSAI.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

3. Which of the following statements correctly describes the statutory appointment of the Commissioner of Food Safety in a State?
(A) The State Government appoints the Commissioner of Food Safety for the state by notification in the Official Gazette.
(B) The State Government appoints the Commissioner of Food Safety not below the rank of a Joint Secretary to the Government of India.
(C) The Chief Executive Officer of FSSAI concurrently acts as the Commissioner of Food Safety for all States.
(D) The Governor of the State independently appoints the Commissioner without notification.

4. A widespread outbreak of foodborne illness has affected multiple districts within a state. Which authority is primarily responsible for coordinating the emergency response and directing the Designated Officers across those districts?
(A) The Union Minister of Health and Family Welfare
(B) The Chief Medical Officer of the local hospital
(C) The Commissioner of Food Safety of the State
(D) The Food Safety Officer of the capital district

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5. Match the officials in List I with their corresponding appointing authorities or jurisdictions in List II.
List I: (Officials)
P. Commissioner of Food Safety
Q. Designated Officer
R. Food Safety Officer
S. Food Analyst
List II: (Appointing Authorities and Jurisdictions)
I. Appointed for a specific local area by the Commissioner
II. Appointed by the State Government for the whole state
III. Recognized for testing samples across a specified jurisdiction
IV. Appointed by the Commissioner for specific districts
(A) P-II, Q-IV, R-I, S-III
(B) P-I, Q-II, R-III, S-IV
(C) P-IV, Q-III, R-II, S-I
(D) P-II, Q-I, R-IV, S-III

6. Identify the incorrect statement regarding the powers and duties of the Commissioner of Food Safety.
(A) The Commissioner can prohibit the manufacture, storage, and sale of any article of food for a maximum of one year in the interest of public health.
(B) The Commissioner conducts surveys of the industrial units engaged in the manufacture of food in the state.

an offence has been committed.
(C) The FSO can arrest the Food Business Operator immediately without a warrant upon finding misbranded food.
(D) The FSO can break open any package containing food if the owner refuses to open it.

37. Consider the following steps in the seizure protocol followed by an FSO:
I. Preparation of an inventory of the seized food.
II. Giving a receipt of the seized food items to the Food Business Operator.
III. Paying the market value of the seized adulterated food to the FBO.
IV. Keeping the seized articles in safe custody.
Which of the above statements is/are correct?
(A) I, II, and III only
(B) I, II, and IV only
(C) II, III, and IV only
(D) I, III, and IV only

38. Food Safety Officers are authorized to exercise all of the following powers EXCEPT:
(A) Collecting samples of any food ingredient or raw material used during commercial food processing.
(B) Seizing commercial books of account or other financial documents related directly to the food business.
(C) Stopping and conducting detailed physical inspections of any vehicle used for transporting food products.
(D) Entering and inspecting a private residential house where absolutely no commercial food activities are run.

39. Identify the correct pair regarding the documentation used by a Food Safety Officer during enforcement.
(A) Form I – Standard formal application used to obtain a Central License
(B) Form V A – Official notice of intention to collect a sample for analysis
(C) Form III – Mandatory comprehensive Annual Return filed by a registered FBO
(D) Form II – Standardized legal memorandum submitted to the Adjudicating Officer

40. Read the given statements and select the correct option.
Statement I: The FSO must tender the price of the food sample calculated at the market rate to the person from whom it is taken.
Statement II: If the person refuses to accept the price, the FSO must return the sample and cannot proceed with testing.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

41. Arrange the sequential steps an FSO must follow while drawing a legal sample for analysis.
1. Issue Form V A (Notice of intention).
2. Divide the sample into four parts.
3. Pay the cost of the sample to the FBO.
4. Seal and label the parts with signatures of the FBO and witnesses.
(A) 1, 3, 2, 4
(B) 1, 2, 3, 4
(C) 3, 1, 2, 4
(D) 2, 1, 4, 3

42. Identify the incorrect pair regarding the terminology used in sampling and enforcement.
(A) Surveillance Sample – Legal sample taken strictly for prosecution purposes
(B) Seizure – Confiscation of suspected food items or records
(C) Homogenization – Mixing the sample uniformly before dividing
(D) Preservative – Chemical added to prevent spoilage of the sample before analysis

43. What is the most appropriate reason for dividing a legal enforcement sample into four parts?
(A) To dispatch the collected samples to four independent state laboratories simultaneously to verify the mathematical average of results.
(B) To guarantee operational transparency, facilitate reference testing during legal disputes, and secure backup samples.
(C) To systematically distribute the portions among the investigating FSO, the municipal police, the court magistrate, and the FBO.
(D) To intentionally escalate the administrative workload and financial overhead of public food testing facilities across the state.

44. A Food Business Operator violently obstructs a Food Safety Officer from entering the manufacturing premises. What is the legal competency of the FSO in this scenario?

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respective local courts.

89. An FSO intercepts a truck carrying packaged drinking water from a neighboring state that appears to be severely misbranded. Does the FSO have the statutory power to inspect and seize the consignment?
(A) No, the FSO cannot act because the water bottle consignment was bottled and packaged in a neighboring state.
(B) No, since only a certified Central Food Safety Officer possesses the authority to stop inter-state transport trucks.
(C) Yes, the FSO can inspect the truck but only if the vehicle driver provides voluntary and written inspection consent.
(D) Yes, because the suspected consignment is physically present within that FSO's designated local area of jurisdiction.

90. Cause: Differing enforcement priorities and varying lab capacities among neighboring states. Effect: Which of the following is the most likely consequence?
(A) The creation of regulatory safe havens for food adulterators in states characterized by weak enforcement systems.
(B) The establishment of highly uniform, standardized food safety regulations and testing policies across all borders.
(C) The complete and immediate structural collapse of all inter-state trade of agricultural and food commodities.
(D) A rapid and significant increase in the volume of high-quality food exports dispatched to international markets.

91. The "Clean Street Food Hub" (CSFH) initiative is a key component of which broader national campaign spearheaded by FSSAI?
(A) Swachh Bharat Abhiyan
(B) Eat Right India
(C) Make in India
(D) Fit India Movement

92. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): The Hygiene Rating Scheme implemented by states is mandatory for all street food vendors.
Reason (R): It aims to empower consumers to make informed choices about where to eat.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

93. Which of the following statements correctly describes the BHOG (Blissful Hygienic Offering to God) initiative implemented by states?
(A) It encourages places of worship to adopt basic food safety and hygiene practices in the preparation of prasad.
(B) It functions as a structured municipal taxation scheme aimed at generating revenue from temple administrations.
(C) It imposes a strict and complete legal ban on the preparation and distribution of traditional food in temples.
(D) It organizes the distribution of free industrial cooking appliances to petty food vendors near religious sites.

94. A cluster of street food vendors operating in a famous local market wishes to attract more tourists by demonstrating high safety standards. Which FSSAI certification should the State Food Authority encourage them to obtain?
(A) RUCO Certification for used cooking oil
(B) Organic India Certification for agriculture
(C) Clean Street Food Hub (CSFH) Certification
(D) AGMARK Quality Standard certification system

95. Match the Eat Right India initiatives in List I with their primary targets/objectives in List II.
List I: (Eat Right India initiatives)
P. RUCO
Q. BHOG
R. Hygiene Rating
List II: (Primary targets/objectives)
I. Rating restaurants and catering establishments based on hygiene
II. Repurposing Used Cooking Oil to produce biodiesel
III. Ensuring safe food practices in places of worship
(A) P-II, Q-III, R-I
(B) P-III, Q-II, R-I
(C) P-I, Q-II, R-III
(D) P-II, Q-I, R-III

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the registration certificate or reject the application within 7 days.
(C) The registration certificate must be prominently displayed at the place of business.
(D) Petty manufacturers must comply with the basic hygiene and safety requirements specified in Schedule 4.

52. Consider the following statements regarding State-level licensing:
I. The Designated Officer acts as the Licensing Authority for State Licenses.
II. A State License is valid for a maximum period of 5 years.
III. State Licensing Authorities have the power to suspend a license if the FBO fails to comply with an improvement notice.
IV. FBOs applying for a State License do not need to submit a water testing report under any circumstances.
Which of the above statements is/are correct?
(A) I, II, and III only
(B) I, III, and IV only
(C) II, III, and IV only
(D) I and II only

53. All of the following are objectives of State-level food surveillance plans EXCEPT:
(A) To trigger instant legal prosecution without laboratory analysis.
(B) To map high-risk food commodities in the market.
(C) To identify seasonal trends in food adulteration.
(D) To guide policy making and resource allocation for enforcement.

54. Identify the correct pair regarding the forms used in the licensing and registration process.
(A) Form B – Official written improvement notice issued to an FBO
(B) Form C – Standard format utilized for filing the annual return
(C) Form D – Formal application structure to request a Central License
(D) Form A – Basic application form used for registration certificates

55. Read the given statements and select the correct option.
Statement I: Samples lifted under surveillance plans are primarily used for gathering data and identifying hotspots, rather than immediate prosecution.
Statement II: An FSO can use a surveillance sample report to directly file a criminal case against an FBO in a court of law.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

56. A local bakery initially obtained a Registration Certificate as its turnover was Rs. 8 lakhs. By the end of the year, due to massive expansion, its turnover crossed Rs. 50 lakhs. What regulatory action must the bakery take?
(A) Formally surrender their current registration and submit an application for a Central License.
(B) Continue all business operations under the existing registration certificate until its official expiry date.
(C) Submit a formal application to upgrade and convert their registration certificate into a State License.
(D) Relocate the entire baking facility to an adjacent state to completely bypass localized regulatory shifts.

57. Identify the incorrect pair regarding the documents required for obtaining a State License.
(A) Form B – Completed, verified, and signed statutory application form
(B) Blueprint/layout plan – Mandated layout document for food manufacturing units
(C) List of Directors/Partners – Complete organizational structure list for companies
(D) FSMS Plan – Document mandated for petty food vendors applying for basic registration

58. What is the ultimate goal of executing State-level surveillance and enforcement plans?
(A) To ensure the steady availability of safe, wholesome food products and safeguard overall public health.
(B) To maximize the absolute volume of food business licenses suspended or canceled in each enforcement district.
(C) To systematically eliminate small-scale and unorganized food vendors from participating in municipal markets.
(D) To deliberately increase the sample analysis workload and operational targets of state food testing labs.

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(A) The FSO is legally obligated to immediately abandon the inspection and cancel the FBO's operational license on the spot.
(B) The FSO is empowered to register a formal complaint for obstruction, which constitutes a punishable offence under the Act.
(C) The FSO is authorized to utilize physical force and engage in a physical altercation to secure immediate entry to the unit.
(D) The FSO must draft an urgent official request to the national FSSAI Chairperson to secure personal intervention on-site.

45. Cause: The Food Safety Officer fails to properly seal and sign the sample container, violating standard protocols.
Effect: Which of the following is the most likely outcome?
(A) The sample may be officially rejected by the Food Analyst, significantly weakening the legal prosecution in court.`
(B) The Food Analyst will accept the unsealed sample but will levy a double administrative fee on the enforcement agency.
(C) The Designated Officer will bypass the laboratory testing and immediately declare the food item unsafe for consumption.
(D) The Food Business Operator will be summarily fined a maximum financial penalty due to the procedural error of the FSO.

46. What is the annual turnover threshold below which a petty food business operator is only required to obtain a Registration Certificate rather than a State License?
(A) Rs. 5 lakhs
(B) Rs. 12 lakhs
(C) Rs. 20 lakhs
(D) Rs. 50 lakhs

47. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): A food manufacturing unit with an annual turnover of Rs. 15 Crores requires a State License.
Reason (R): State Licenses are issued by the Commissioner of Food Safety directly to medium-scale food businesses.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

48. Which of the following statements correctly describes a State-level surveillance plan?
(A) It is an enforcement strategy designed exclusively to maximize the collection of monetary fines from local street food vendors.
(B) It replaces the requirement for routine physical inspections by relying completely on incoming consumer grievance complaints.
(C) It is the structured collection, analysis, and interpretation of food safety data to proactively manage risk and enforce rules.
(D) It is a centralized planning exercise managed solely by the federal administration without any direct state-level involvement.

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49. A Food Business Operator manufactures packaged snacks and operates in four different states. Based on the FSS (Licensing and Registration of Food Businesses) Regulations, which type of license must the FBO obtain for their Head Office?
(A) Multiple State Licenses
(B) A Central License
(C) A local Panchayat Registration
(D) A purely voluntary certification

50. Match the annual turnover limits in List I with the corresponding regulatory requirement in List II.
List I: (Annual turnover limits)
P. Upto Rs. 12 Lakhs
Q. Between Rs. 12 Lakhs and Rs. 20 Crores
R. Above Rs. 20 Crores
List II: (Regulatory requirement)
I. Central License
II. State License
III. Registration Certificate
(A) P-III, Q-II, R-I
(B) P-I, Q-II, R-III
(C) P-II, Q-III, R-I
(D) P-III, Q-I, R-II

51. Identify the incorrect statement regarding the registration of petty food business operators.
(A) A petty food manufacturer is permitted to produce proprietary foods and novel foods without a license.
(B) The registering authority must issue

(A) State labs must adhere to ISO/IEC 17025 standards for testing and calibration.
(B) State labs face challenges related to the shortage of trained manpower and modern equipment.
(C) FSSAI implements a Central Sector Scheme for the strengthening of the food testing system in states.
(D) Unaccredited state labs can still issue legally binding reports for criminal prosecutions indefinitely.

67. Consider the following mechanisms used to enhance coordination between FSSAI and State Food Authorities:
I. Regular meetings of the Central Advisory Committee (CAC).
II. Signing of Memorandums of Understanding (MoUs) for capacity building.
III. Implementation of centralized IT portals like FoSCoS and INFoLNET.
IV. Complete transfer of state enforcement powers to central FSSAI officials.
Which of the above statements is/are correct?
(A) I, II, and IV only
(B) I, II, and III only
(C) II, III, and IV only
(D) I and III only

68. The members of the Central Advisory Committee (CAC) include all of the following EXCEPT:
(A) Commissioners of Food Safety of all States and UTs
(B) Representatives from the food industry and consumer organizations
(C) The Chief Justice of India
(D) Representatives from agricultural and research institutions

69. Identify the correct pair regarding the IT tools used for central-state coordination.
(A) FoSCoS – Food safety compliance and licensing
(B) INFoLNET – Managing consumer grievances directly
(C) Food Safety Connect – Laboratory networking and data management
(D) FoSTaC – Online portal for importing food items

70. Read the given statements and select the correct option.
Statement I: State Food Authorities are heavily dependent on FSSAI for defining scientific standards of food products.
Statement II: State Food Authorities have the power to create completely new parallel standards for food additives independent of FSSAI.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

71. Arrange the chronological steps typically followed in the upgradation of a State Food Testing Laboratory under FSSAI's strengthening scheme.
1. Identification of infrastructural gaps by the State.
2. Submission of a proposal to FSSAI.
3. Release of funds and procurement of high-end equipment (e.g., LC-MS/MS).
4. Training of laboratory personnel and NABL accreditation.
(A) 2, 1, 3, 4
(B) 1, 2, 3, 4
(C) 1, 3, 2, 4
(D) 4, 1, 2, 3

72. Identify the incorrect pair regarding the function and the competent authority.
(A) Setting food standards – Handled and promulgated by the central FSSAI
(B) Issuing State Licenses – Managed at the district level by the Designated Officer
(C) Appointing Food Analysts for Referral Labs – Decided by the State Government
(D) Accrediting laboratories – Managed by the National Accreditation Board for Laboratories

73. What is the most appropriate reason why NABL accreditation is made mandatory for State Food Testing Laboratories?
(A) It serves to guarantee that the state laboratory consistently generates maximum operational revenue from food tests.
(B) It legally permits regional and state administrative divisions to completely bypass central FSSAI rules and standards.
(C) It effectively eliminates the technical requirement of recruiting and employing a certified and qualified Food Analyst.
(D) It ensures the technical competence, procedural impartiality, and global acceptability of laboratory test findings.

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74. A Food Analyst receives a sample from an FSO and discovers it contains prohibited toxic colorants. According to standard competency guidelines, within what maximum timeframe should the Analyst ideally send the report to the Designated Officer?
(A) 7 days
(B) 14 days
(C) 30 days
(D) 60 days

75. Cause: A state laboratory operates without NABL accreditation and utilizes outdated testing methodologies.
Effect: Which of the following is the most significant legal implication?
(A) The laboratory operations will be heavily subsidized and funded by local municipal administrative bodies.
(B) Analytical reports generated can be successfully contested and set aside in court, obstructing enforcement.
(C) The laboratory facility is legally restricted to analyzing strictly non-perishable processed food products.
(D) The presiding Food Analyst is granted an automatic executive promotion to the post of Designated Officer.

76. Who holds the primary responsibility for the on-ground enforcement of food safety regulations in inter-state commerce of food within a specific state's borders?
(A) Central Bureau of Investigation
(B) State Food Safety Authorities
(C) FSSAI Central Officers exclusively
(D) Ministry of Commerce

77. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): Tracing the origin of adulterated food moving across state borders is a significant challenge for State Food Authorities.
Reason (R): State Food Safety Officers have jurisdiction strictly limited to their assigned local areas within their state.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

78. Which of the following statements correctly addresses inter-state food safety coordination?
(A) A state can permanently block agricultural and food trade from neighboring regions without any scientific justification.
(B) Inter-state food logistical networks and commercial transporters are completely exempt from central FSSAI licensing.
(C) FSSAI functions as the nodal agency to coordinate intelligence sharing and joint actions among state-level authorities.
(D) State-level Food Safety Officers possess the statutory power to conduct independent raids in neighboring states.

79. Contaminated packaged milk manufactured in State A is found being sold in State B. What is the correct protocol for State B's Food Authority to handle this?
(A) State B's local FSO must travel across borders to State A and directly arrest the manufacturing company owner.
(B) State B is legally required to implement a sweeping, total ban on all milk and dairy items sold in its markets.
(C) State B must completely ignore the safety concern since the manufacturing facility is based outside its borders.
(D) State B should seize the products, and alert State A's Commissioner of Food Safety along with FSSAI for source-level action.

80. Match the state-specific challenges in List I with their standard mitigation strategies in List II.
List I: (State-specific challenges)
P. Shortage of Food Safety Officers
Q. Lack of advanced testing equipment
R. Fragmented unorganized sector
List II: (Mitigation strategies)
I. Conducting FoSTaC and mass awareness campaigns
II. Utilizing FSSAI's Central Sector Scheme for lab upgradation
III. Rationalizing jurisdiction and utilizing mobile food testing vans
(A) P-III, Q-II, R-I
(B) P-I, Q-II, R-III
(C) P-II, Q-III, R-I
(D) P-III, Q-I, R-II

81. Identify the incorrect statement regarding the handling of state-specific enforcement challenges.
(A) Topographical challenges in hilly states

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require specialized mobile testing infrastructure.
(B) States are authorized to lower the national hygiene standards to accommodate poor street vendors permanently.
(C) Widespread adulteration during festival seasons is mitigated by launching special surveillance drives.
(D) Manpower shortages are often addressed by empowering other health officials or using contractual technical staff.

82. Consider the following common challenges faced by State Food Authorities in enforcement:
I. Inadequate infrastructure of Food Testing Laboratories.
II. High pendency of cases in adjudication and judicial courts.
III. Over-abundance of highly trained technical manpower.
IV. Difficulties in monitoring the unorganized street food sector.
Which of the above statements is/are correct?
(A) I, II, and III only
(B) I, II, and IV only
(C) II, III, and IV only
(D) I, III, and IV only

83. State Food Authorities encounter all of the following challenges in enforcing food safety EXCEPT:
(A) Dealing with a massive surplus of funding and central grants.
(B) Tracing the supply chain of loosely sold, unbranded edible oils.
(C) Managing the logistics of inter-state food recall procedures.
(D) Regulating temporary food stalls during large religious gatherings and melas.

84. Identify the correct pair regarding the authority and its role in inter-state coordination.
(A) Inter-State Council – Drafts scientific standards for food
(B) Designated Officer – Directly corresponds with international food safety bodies
(C) FSSAI – Facilitates rapid alert systems between states
(D) Gram Panchayat – Manages cross-border truck inspections

85. Read the given statements and select the correct option.
Statement I: The Commissioner of Food Safety of a state can prohibit the entry of an unsafe food article from another state for up to one year.
Statement II: Such a prohibition order does not require any scientific justification or risk assessment.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

86. A racket involving the adulteration of edible oil is discovered operating across three adjacent states. What is the most effective enforcement strategy to dismantle this racket?
(A) Directing each state to act in total isolation and target only small municipal retail oil vendors locally.
(B) Postponing enforcement actions and waiting for the adulterated oil batches to naturally expire in the market.
(C) Deploying federal armed forces and central military personnel to manage all private edible oil manufacturing plants.
(D) Establishing a Joint Task Force coordinated by FSSAI that involves the Food Safety Commissioners of the affected states.

87. Identify the incorrect pair regarding an enforcement challenge and its direct impact.
(A) Poor lab infrastructure – Delays in generating analysis reports
(B) Large unorganized sector – Easy implementation of full traceability
(C) High pendency in courts – Weakens the deterrent effect of the law
(D) Porous state borders – Increased influx of unmonitored adulterated food

88. What is the most appropriate mechanism to resolve severe inter-state food safety enforcement disputes or overlapping investigations?
(A) Conducting televised media trials and public debates hosted by regional news broadcasting channels.
(B) Handing over complete administrative charge of food safety enforcement to state police departments permanently.
(C) Intervention and active coordination by FSSAI central headquarters along with the Central Advisory Committee.
(D) Encouraging inter-state FSOs to file mutual criminal FIRs against each other in their

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Which of the following is the key parameter the FSO must assess to ensure compliance?
(A) Continuous availability of high-end imported ingredients and exotic food flavorings on the cart
(B) Proof of annual commercial turnover of the street vendor exceeding a threshold of fifty lakh rupees
(C) Compliance with wearing aprons and headgear, combined with the verified use of clean potable water
(D) Mandatory permanent physical presence of a certified, full-time qualified Food Analyst at the cart

105. Cause: Extensive hygiene training of street food vendors under FoSTaC by State Authorities.
Effect: Which of the following is the most direct outcome?
(A) A significant increase in the operational cost of local street food, rendering it completely unaffordable for average citizens.
(B) Large-scale abandonment of the street food trade by vendors in favor of finding employment in industrial manufacturing factories.
(C) The complete and absolute eradication of all bacterial and viral foodborne pathogens across the entire state on a permanent basis.
(D) Marked improvements in food handling, a decrease in microbiological contamination, and a solid rise in public consumer trust.

106. What does the acronym FoSTaC stand for in the context of training programmes for food safety?
(A) Food Safety Training and Certification
(B) Food Standards Testing and Compliance
(C) Food Surveillance Tracking and Control
(D) Food System Technology and Communication

107. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): Urban Local Bodies (ULBs) have the independent statutory power to issue Food Safety Licenses overriding the Designated Officer.
Reason (R): The FSS Act, 2006 supersedes the food licensing powers previously held by municipalities under the old PFA regime.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

108. Which of the following statements correctly outlines the role of Gram Panchayats in food safety?
(A) They are legally authorized to define maximum permissible limits for toxic heavy metals in local agricultural crops.
(B) They serve as registering authorities for local petty operators in some states and help conduct grassroots campaigns.
(C) They manage and operate state-level microbiological and chemical Food Testing Laboratories within their village borders.
(D) They are empowered to adjudicate civil and criminal cases and levy penalties up to ten lakh rupees for unsafe food.

109. A state government plans a widespread awareness campaign on safe milk consumption in rural areas. Which local entity is best positioned to coordinate this campaign at the grassroots level?
(A) The Gram Panchayat
(B) The State High Court
(C) The National Reference Laboratory
(D) The Central Advisory Committee

110. Match the types of training under FoSTaC in List I to their target groups in List II.
List I: (Types of training under FoSTaC)
P. Basic Training
Q. Advance Training
R. Special Training
List II: (Target groups)
I. High-risk food businesses like meat, dairy, or edible oil packaging
II. Petty food business operators, street vendors, and small retailers
III. State licensed and Central licensed large manufacturing units
(A) P-II, Q-III, R-I
(B) P-I, Q-II, R-III
(C) P-III, Q-I, R-II
(D) P-II, Q-I, R-III

111. Identify the incorrect statement regarding the powers of Municipal Corporations/ULBs under the current FSS Act regime.
(A) ULBs assist State Food Authorities in enforcing basic hygiene at local markets.
(B) ULB health inspectors can act as FSOs if

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96. Identify the incorrect statement regarding the implementation of the Hygiene Rating Scheme by State Food Authorities.
(A) It relies on audits conducted by FSSAI-recognized auditing agencies.
(B) Establishments are rated on a scale of 1 to 5 smiles/stars.
(C) It is strictly utilized to automatically cancel the licenses of 1-star rated restaurants.
(D) It creates a competitive environment among food businesses to improve hygiene standards.

97. Consider the following requirements for declaring a cluster as a Clean Street Food Hub (CSFH):
I. The hub must have a minimum cluster of 50 street food vendors (varies slightly by state/city size).
II. Vendors must be registered under the FSS Act.
III. Vendors must undergo training in basic food safety and hygiene.
IV. The hub must completely ban the sale of non-vegetarian food.
Which of the above statements is/are correct?
(A) I, II, and III only
(B) I, II, and IV only
(C) II, III, and IV only
(D) I, III, and IV only

98. State implementation of FSSAI initiatives includes all of the following EXCEPT:
(A) Eat Right Campus
(B) Clean Street Food Hub
(C) Repurpose Used Cooking Oil (RUCO)
(D) Swachh Vidyalaya Abhiyan

99. Identify the correct pair regarding an FSSAI initiative and its target audience.
(A) Eat Right Campus – Focuses on workplaces, schools, universities, and hospitals
(B) BHOG – Target audience is commercial railway catering networks and station stalls
(C) RUCO – Regulates small-scale fresh vegetable markets and wholesale mandi traders
(D) Clean Street Food Hub – Targets high-end five-star hotel kitchens and luxury resorts

100. Read the given statements and select the correct option.
Statement I: State Food Authorities are responsible for identifying potential clusters and conducting pre-audits for the Clean Street Food Hub certification.
Statement II: FSSAI directly manages and penalizes individual street vendors within these hubs without state involvement.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

101. Arrange the process of obtaining a Clean Street Food Hub (CSFH) certification in the correct sequence.
1. Identification of the street food cluster by the State Food Authority.
2. Gap analysis and training of vendors on hygiene practices.
3. Final audit by an FSSAI-empaneled agency.
4. Awarding of the CSFH certificate by FSSAI.
(A) 1, 2, 3, 4
(B) 2, 1, 4, 3
(C) 1, 3, 2, 4
(D) 3, 1, 2, 4

102. Identify the incorrect pair regarding the description of Eat Right initiatives.
(A) RUCO – Prevents the systematic commercial reuse of highly degraded edible cooking oil
(B) Hygiene Rating – Operates as a voluntary safety audit scheme for food establishments
(C) BHOG – Promotes and enhances food safety and preparation hygiene in religious places
(D) Eat Right Station – Provides certifications for safe food practices at major airports exclusively

103. What is the primary role of the state in regulating street food hygiene?
(A) To systematically shut down all informal street food vendors to actively promote high-end registered restaurants.
(B) To streamline registration, deliver hygiene training, and coordinate basic amenities like clean water and waste disposal.
(C) To extract the maximum possible amount of goods and services tax (GST) and licensing fees from poor street vendors.
(D) To enforce extremely complex international codex safety standards and analytical controls directly on mobile street carts.

104. An FSO is inspecting a street food vendor registered under a Clean Street Food Hub.

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59. A Designated Officer reviews surveillance data showing a consistently high failure rate in paneer samples from a specific locality. What is the most competent next step?
(A) Place an immediate and complete statewide ban on the sale and consumption of all paneer products.
(B) Instruct local FSOs to execute targeted legal sampling and strict enforcement checks in that specific area.
(C) Disregard the surveillance findings entirely as informal sample reports possess no legal prosecutorial value.
(D) Cancel the manufacturing and operational licenses of all milk and dairy processing units operating in the state.

60. Cause: Implementation of a robust, risk-based state surveillance plan.
Effect: Which of the following is the most likely outcome?
(A) Valuable administrative resources and enforcement budgets are consistently wasted inspecting highly compliant entities.
(B) Highly efficient allocation of state enforcement assets toward elevated-risk products and localized adulteration hubs.
(C) A significant and unscientific reduction in the frequency of targeted sampling actions conducted by municipal FSOs.
(D) The total collapse and complete eradication of registered commercial food enterprises in remote rural territories.

61. State food testing laboratories are required to be accredited by which of the following bodies to ensure the validity of their test results under the FSS Act?
(A) NABL
(B) BIS
(C) AGMARK
(D) ISO

62. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): FSSAI provides financial and technical assistance to upgrade State Food Testing Laboratories.
Reason (R): Many State Food Authorities lack the adequate infrastructure and funding to maintain state-of-the-art testing equipment.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

63. Which of the following statements correctly describes the role of the Central Advisory Committee (CAC) in central-state coordination?
(A) It functions as an independent judicial tribunal to settle administrative disputes between the central FSSAI and states.
(B) It operates as a direct financial auxiliary body tasked with funding the micro-operations of street food vendors.
(C) It oversees and manages the international trade, import, and custom clearance of food items with no state input.
(D) It serves as a collaborative forum for State Food Safety Commissioners to advise FSSAI on enforcement and standards.

64. If an FBO disputes the analysis report provided by a State Food Testing Laboratory, to which institution can the sample be sent for appellate testing?
(A) The National Institute of Nutrition
(B) The local primary health center laboratory
(C) A Referral Food Laboratory
(D) A basic NABL accredited private lab of the FBO's choice

65. Match the type of laboratory in List I with its function in List II.
List I: (Type of laboratory)
P. Primary Food Testing Laboratory
Q. Referral Food Laboratory
R. National Reference Laboratory
List II: (Function)
I. Resolves disputes regarding test results (Appellate lab)
II. Standardizes testing methods and provides proficiency testing
III. Conducts routine analysis of enforcement samples sent by FSOs
(A) P-III, Q-I, R-II
(B) P-I, Q-II, R-III
(C) P-II, Q-III, R-I
(D) P-III, Q-II, R-I

66. Identify the incorrect statement regarding the accreditation and capacity of State Food Testing Laboratories.

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appropriately qualified and notified by the Commissioner.
(C) ULBs help in organizing infrastructure like clean water and waste disposal for street food hubs.
(D) ULBs can draft their own separate legal standards for food adulteration independent of FSSAI.

112. Consider the following statements regarding the Food Safety Supervisor requirement:
I. Every licensed food business must have at least one trained and certified Food Safety Supervisor.
II. The training is provided under the FoSTaC program.
III. The Supervisor ensures that food safety protocols are implemented within the establishment.
IV. Supervisors are appointed and paid directly by the FSSAI.
Which of the above statements is/are correct?
(A) I, II, and IV only
(B) I, II, and III only
(C) II, III, and IV only
(D) I and III only

113. Roles of Urban Local Bodies (ULBs) in facilitating food safety include all of the following EXCEPT:
(A) Providing infrastructural support for slaughterhouses to maintain hygiene.
(B) Issuing Central Licenses to multi-national food corporations.
(C) Assisting in the registration of petty food vendors.
(D) Facilitating the management of solid waste generated by food markets.

114. Identify the correct pair regarding the training level and its corresponding curriculum focus.
(A) Basic FoSTaC – Understanding and applying highly complex Hazard Analysis and Critical Control Points (HACCP) protocols
(B) Advance FoSTaC – Gaining structural knowledge on how to apply for and obtain commercial vehicle driving licenses
(C) Awareness Training – Detailed legal and prosecutorial procedures used by state attorneys for filing criminal court cases
(D) Special FoSTaC (Dairy) – Technical mitigation of chemical and microbiological contaminants in milk and dairy products

115. Read the given statements and select the correct option.
Statement I: State governments can designate Panchayat Secretaries as Registering Authorities for petty food businesses.
Statement II: Panchayat Secretaries have the authority to sentence food adulterators to imprisonment.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

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116. A Gram Panchayat notices that local sweet shops use highly unhygienic practices during festivals. What is the most appropriate action the Panchayat should take to integrate food safety?
(A) Authorize local village groups to immediately burn down and completely destroy the unhygienic sweet preparation facilities.
(B) Unilaterally grant an official Central License to the local sweet shops so they can permanently bypass state inspection.
(C) Report the issue to the district Designated Officer and organize a structured FoSTaC training session for the vendors.
(D) Confiscate all sweets prepared in the village and distribute them immediately as free mid-day meals in primary schools.

117. Identify the incorrect pair regarding the entity and its statutory power.
(A) Gram Panchayat – Issuing State Licenses for large factories
(B) FSSAI – Standard setting
(C) Commissioner of Food Safety – Prohibiting sale during outbreaks
(D) Designated Officer – Sanctioning prosecution

118. What is the most effective way Urban Local Bodies (ULBs) can support the state food safety enforcement machinery?
(A) By establishing and operating completely separate, parallel, and legally conflicting local municipal food licensing systems.
(B) By passing local ordinances declaring the preparation and sale of all street food items completely illegal within town limits.
(C) By actively replacing certified FSOs with untrained municipal sweepers to conduct routine enforcement and sample collection.
(D) By developing municipal market

dining restaurants and major multi-national food manufacturing hubs in rural zones.

(B) The presence of excessive statutory awareness and strict over-compliance with food safety laws by small rural petty vendors.

(C) A highly dominant unorganized sector, loose sale of commodities, and extremely limited enforcement personnel for vast areas.

(D) The rapid establishment and widespread availability of too many highly advanced, fully accredited public testing facilities.

149. The Commissioner of Food Safety is conducting a stakeholder engagement meeting involving industry, consumer groups, and FSOs. What is the most competent priority topic to discuss to ensure proactive food safety?

(A) Analyzing shared surveillance data to collaboratively isolate food safety risks and elevate voluntary business compliance.

(B) Lobbying the state health department to immediately double the base monthly salaries and travel allowances of district FSOs.

(C) Designing strict administrative protocols to penalize and silence public whistleblowers who report suspected adulteration.

(D) Formulating and debating the political campaign strategies for upcoming state assembly and municipal corporation elections.

150. Cause: A state consistently achieves a top ranking in the State Food Safety Index (SFSI) by improving infrastructure, manpower, and compliance.

Effect: Which of the following is the most holistic outcome?

(A) The state is automatically excluded from all central FSSAI funding schemes on the grounds that it no longer requires assistance.

(B) Commercial food operators completely relocate their production units to adjacent states to actively evade strict local audits.

(C) The national Food Safety and Standards Act is formally revoked in that state because of a recorded zero-adulteration rate.

(D) The state gains national recognition, secures financial capacity-building rewards, and achieves high consumer trust in its food.

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(A) It offers a completely unified, centralized digital window for handling all licenses and registrations across every state in India.
(B) It systematically eliminates the mandatory requirement of submitting hard physical documents during the online application process.
(C) It is structured to allow members of the general public to arbitrarily cancel any active food business license without verification.
(D) It provides seamless and robust technological integration with other critical national platforms including INFoLNET and FoSTaC.

127. Consider the following statements regarding the Food Safety Appellate Tribunal (FSAT):
I. It hears appeals against the decisions of the Adjudicating Officer.
II. It is presided over by a person who is or has been a District Judge.
III. Its decisions are final and cannot be appealed in the High Court.
IV. It was established to ensure speedy disposal of food safety civil disputes.
Which of the above statements is/are correct?
(A) I, II, and III only
(B) I, II, and IV only
(C) II, III, and IV only
(D) I and IV only

128. FSSAI has developed various IT tools to aid State Food Authorities. Which of the following is NOT an official FSSAI IT platform?
(A) INFoLNET
(B) FoSCoS
(C) FoodTrak
(D) Food Safety Connect

129. Identify the correct pair regarding the IT application and its primary purpose.
(A) FoSCoS – Interactive learning and training module for street food vendors
(B) INFoLNET – Network that connects all accredited food testing laboratories
(C) FoSTaC – Dedicated online digital portal for direct consumer grievance redressal
(D) Swasth Bharat Yatra – Mobile application used for submitting import clearance forms

130. Read the given statements and select the correct option.
Statement I: The Adjudicating Officer must be an officer not below the rank of Additional District Magistrate.
Statement II: The Adjudicating Officer possesses the powers of a civil court.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

131. Arrange the stages of the adjudication process in the correct sequence.
1. Filing of an appeal to the Food Safety Appellate Tribunal (if aggrieved).
2. Adjudicating Officer holds an inquiry and passes an order.
3. Designated Officer sanctions the prosecution.
4. FSO files the application/memorandum before the Adjudicating Officer.
(A) 3, 4, 2, 1
(B) 4, 3, 2, 1
(C) 3, 2, 4, 1
(D) 2, 3, 4, 1

132. Identify the incorrect pair regarding a tech platform and its function.
(A) FoSCoS – Processing state and central licenses
(B) INFoLNET – Tracking laboratory analysis reports
(C) FoSTaC – Managing inter-state GST tax collection on food
(D) Food Safety Connect – Allowing consumers to register complaints

133. What is the most appropriate advantage of shifting from the old FLRS system to the new FoSCoS platform?
(A) It shifts licensing from manual, text-box entries to standardized product-based categories, streamlining compliance.
(B) It completely revokes and removes the constitutional authority of state departments to oversee or monitor local licenses.
(C) It totally dismantles and eliminates the mandatory requirement of utilizing certified food testing labs for product analysis.
(D) It grants individual food business operators the complete authority to formulate and apply their own safety standards.

134. An FBO is fined Rs. 3 Lakhs by the Adjudicating Officer for selling sub-standard food. The FBO believes the lab report was flawed. Where must the FBO appeal to challenge this order?
(A) The High Court of the concerned State

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those of the Food Safety Officer are regulated under Section thirty-seven.

10. (C) Statement I is true but Statement II is false.
India's food safety system utilizes a cooperative federalism model where central and state entities collaborate on enforcement. Under this framework, the central food authority possesses the exclusive power to formulate rules, regulations, and food product standards. State Governments are charged with executing and enforcing these centralized standards rather than creating parallel state-level product standards.

11. (A) 2, 4, 3, 1
The hierarchical enforcement structure of the State Food Authority begins with the Commissioner of Food Safety at the apex state level. This is followed sequentially by the Joint Food Safety Commissioner, then the district-level Designated Officer, and finally the Food Safety Officer who operates directly at the grassroots level to perform field-level enforcement duties.

12. (B) Food Analyst – Adjudicating Penalty for Unsafe Food
The Food Analyst is a technical official responsible for analyzing food samples and issuing analytical reports. This role does not include any judicial or administrative power to adjudicate penalties or legal disputes. Instead, the task of adjudicating penalties for violations of food safety rules is legally assigned to the designated state-level Adjudicating Officer.

13. (A) To ensure uniform national standards while enabling localized enforcement and rapid emergency response.
Granting concurrent jurisdictional status to food safety ensures that the country maintains unified, science-based national standards. At the same time, this constitutional arrangement enables state administrations to manage localized enforcement, operate local testing laboratories, and execute rapid emergency responses tailored to regional challenges, preventing administrative disconnects during localized foodborne illness outbreaks or crises.

14. (C) The Commissioner of Food Safety
Section thirty of the Food Safety and Standards Act empowers the state-level Commissioner of Food Safety to prohibit the manufacture, storage, distribution, or sale of any food article. This statutory authority can be exercised in the interest of public health for a maximum period of one year, particularly during emergencies or contamination incidents.

15. (D) Enhanced capacity to manage localized foodborne outbreaks and regional market adulterations.
A decentralized food safety enforcement structure places field officers, testing facilities, and district-level administrators directly within local jurisdictions. This geographical placement enhances the overall administrative capacity to rapidly manage localized foodborne outbreaks, monitor regional market conditions, and investigate specific food adulteration patterns that might otherwise bypass centralized oversight mechanisms.

16. (C) The Commissioner of Food Safety
Section thirty-six of the Food Safety and Standards Act specifies that the Commissioner of Food Safety is the statutory authority responsible for appointing the Designated Officer for each district. The Designated Officer acts as the immediate administrative head and licensing authority for that particular district, supervising the local Food Safety Officers.

17. (B) Both A and R are true but R is not the correct explanation of A.
The Designated Officer holds the legal power to sanction prosecutions for offences punishable with fines only. This officer also acts as the primary licensing authority for state-level food businesses. While both statements are legally accurate, the licensing function does not serve as the logical or structural explanation for the officer's prosecutorial sanctioning authority.

18. (D) The Designated Officer receives the report of the Food Analyst and decides whether to launch prosecution.
Under the administrative procedures of the Act, the Designated Officer receives the official report of the Food Analyst after a sample is tested. It is the Designated Officer's statutory responsibility to evaluate this analytical report and decide whether to initiate civil adjudication or recommend criminal prosecution against the concerned operator.

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141. Identify the incorrect statement regarding rural food safety enforcement challenges.
(A) Rural markets rely exclusively on packaged food items from top multinational brands, removing all local adulteration risk.
(B) Widely dispersed geographical layouts and vast terrains make routine physical inspections highly challenging for active FSOs.
(C) A systemic lack of awareness among rural food operators regarding mandatory licensing and registration is a primary hurdle.
(D) Counterfeit, expired, and highly sub-standard packaged food items are frequently dumped in rural markets due to low surveillance.

142. Consider the following functions of the State Advisory Committee:
I. Advising the State Government on matters relating to food safety.
II. Drafting national regulations for food additives.
III. Promoting cooperation between the Food Authority, enforcement agencies, and industry.
IV. Monitoring the performance of the Food Safety Appellate Tribunal.
Which of the above statements is/are correct?
(A) I, II, and III only
(B) I and III only
(C) II, III, and IV only
(D) I, III, and IV only

143. Best practices adopted by high-performing states in food safety management include all of the following EXCEPT:
(A) Utilizing Food Safety on Wheels (Mobile Testing Vans) for remote areas.
(B) Organizing regular FoSTaC training for food handlers.
(C) Establishing robust grievance redressal portals for consumers.
(D) Imposing indefinite blanket bans on raw agricultural commodities.

144. Identify the correct pair regarding the parameter and its role in performance assessment.
(A) Food Safety on Wheels – Serves as a specialized transit vehicle used exclusively to transport arrested FBOs.
(B) Central Advisory Committee – Evaluates global agricultural commodity prices and monitors international export markets.
(C) State Food Safety Index – Fosters a healthy, competitive ecosystem that catalyzes proactive state-level enforcement.
(D) FoSCoS – Operates as an online weather forecasting tool to generate daily meteorological advisories for local farmers.

145. Read the given statements and select the correct option.
Statement I: The State Food Safety Index (SFSI) acts as a tool to measure the qualitative and quantitative performance of State Food Authorities.
Statement II: States that perform poorly on the SFSI are immediately stripped of their constitutional powers over food safety.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

146. A Food Safety Officer is assigned to a vast rural district with hundreds of scattered remote villages. What is the most effective enforcement and surveillance strategy for this geography?
(A) Wait passively for rural consumers to travel long distances to the district headquarters to file physical complaints.
(B) Focus enforcement efforts exclusively on the few registered town restaurants while completely ignoring remote villages.
(C) Order that all small rural food vendors must courier physical samples of their products to the capital laboratory daily.
(D) Deploy Mobile Food Testing Vans (Food Safety on Wheels) to conduct on-the-spot analysis and run local awareness camps.

147. Identify the incorrect pair regarding the stakeholder and their role in the State Advisory Committee.
(A) Foreign Diplomats – Vetoing state food safety policies based on international trade
(B) Consumer Organizations – Representing the interests and grievances of the public
(C) Food Industry Representatives – Providing practical insights on compliance challenges
(D) Agricultural Experts – Guiding policies on primary production and pesticide residues

148. What is considered the greatest challenge in enforcing food safety in rural areas?
(A) An extremely high density of luxury fine-

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infrastructure like water and waste disposal networks while coordinating closely with local FSOs.

119. An FSO is coordinating with a Municipal Health Officer to improve hygiene in a local fish market. What competency must the FSO leverage in this scenario?
(A) The statutory power and authority to unilaterally dissolve the local Municipal Corporation and suspend its health department.
(B) Technical food safety knowledge combined with active inter-departmental cooperation to improve market infrastructure.
(C) Professional legal expertise to initiate and file high-level civil lawsuits against the Municipal Health Officer directly.
(D) Specialized financial accounting skills to conduct comprehensive audits of the local municipal corporation's revenue.

120. Cause: A lack of FoSTaC trained Food Safety Supervisors in catering establishments.
Effect: Which of the following is the most likely consequence?
(A) Highly consistent and excellent voluntary maintenance of personal hygiene by all commercial kitchen staff members.
(B) The automatic administrative upgrade of the business operator's registration certificate to a Central License.
(C) Elevated risks of cross-contamination and persistent failure to satisfy the mandatory Schedule 4 safety criteria.
(D) A significant and noticeable reduction in the daily inspection workload and analytical targets of district FSOs.

121. What is the name of the cloud-based, pan-India IT platform launched by FSSAI for food safety compliance and licensing/registration?
(A) FLRS
(B) FoodTrak
(C) e-NAM
(D) FoSCoS

122. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): The Adjudicating Officer has the power to impose penalties for offences like selling unsafe food that results in death.
Reason (R): Unsafe food offences resulting in injury or death are criminal matters tried in judicial courts, not by Adjudicating Officers.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

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123. Which of the following statements correctly outlines the powers of the Adjudicating Officer at the state level?
(A) The Adjudicating Officer is exclusively responsible for trying serious criminal offenses punishable with long-term prison sentences.
(B) The Adjudicating Officer conducts formal inquiries and levies financial fines for civil violations like sub-standard products.
(C) The Adjudicating Officer is directly selected and appointed by the executive members of the local rural Gram Panchayat.
(D) The Adjudicating Officer possesses the central statutory authority to draft, update, and publish national food standards.

124. A Food Safety Officer receives an analyst report confirming that a batch of honey is "misbranded" but perfectly safe for consumption. Where should the FSO file the case for penal action?
(A) The Supreme Court of India
(B) The Adjudicating Officer
(C) The Judicial Magistrate First Class
(D) The Food Safety Appellate Tribunal

125. Match the nature of the offence in List I with the correct jurisdictional authority in List II.
List I: (Nature of the offence)
P. Selling sub-standard food
Q. Selling unsafe food causing grievous injury
R. Operating without a required license
S. Misleading advertisement
List II: (Jurisdictional authority)
I. Judicial Magistrate / Criminal Court
II. Adjudicating Officer
(A) P-II, Q-I, R-I, S-II
(B) P-I, Q-II, R-I, S-II
(C) P-II, Q-I, R-II, S-II
(D) P-II, Q-II, R-I, S-I

126. Identify the incorrect statement regarding the functionalities of the FoSCoS portal.

ANSWERS

1. (B) Concurrent List
The Seventh Schedule of the Indian Constitution lists "adulteration of foodstuffs and other goods" under the Concurrent List. This constitutional placement empowers both the Parliament of India and the various State Legislatures to enact laws, manage regulatory frameworks, and establish enforcement mechanisms to control food safety and prevent adulteration across the country.

2. (C) A is true but R is false.
The Commissioner of Food Safety is the administrative head responsible for the efficient implementation of food safety standards at the state level. However, this official is appointed directly by the respective State Government, rather than the Central Government or under the recommendations of the central food authority, making the assertion accurate but the reason incorrect.

3. (A) The State Government appoints the Commissioner of Food Safety for the state by notification in the Official Gazette.
Section thirty of the Food Safety and Standards Act mandates that the State Government must appoint the Commissioner of Food Safety for the state. This statutory appointment is made formal through an official notification published in the Gazette, ensuring a clear administrative hierarchy and legally designated authority for enforcing food safety protocols within that state.

4. (C) The Commissioner of Food Safety of the State
During a widespread foodborne illness outbreak affecting multiple districts, the state-level Commissioner of Food Safety holds the statutory power to coordinate the emergency response. This apex state authority directs and supervises the actions of the district-level Designated Officers and Food Safety Officers, ensuring a unified, rapid, and efficient containment strategy to protect public health.

5. (A) P-II, Q-IV, R-I, S-III
Under the administrative structure, the Commissioner of Food Safety is appointed by the State Government for the entire state. Designated Officers are appointed by the Commissioner for specific districts, Food Safety Officers are assigned to defined local areas, and Food Analysts are recognized for testing samples within specified jurisdictions to maintain standard food safety protocols.

6. (D) The Commissioner is empowered to independently amend the national standards set by the FSSAI to suit state requirements.
The Food Safety and Standards Authority of India holds the exclusive statutory power to set and amend national food standards. While the state Commissioner of Food Safety is responsible for enforcement, administration, surveys, and sanctioning prosecutions within the state, this official lacks any legal authority to modify or independently rewrite these standardized national regulations.

7. (B) I, II, and IV only
The administrative structure of the State Food Authority places Food Safety Officers under the direct control of the Designated Officer, who must be a whole-time official. Additionally, State Food Testing Laboratories operate under the Commissioner of Food Safety. However, Adjudicating Officers are appointed by the State Government, not by the local Food Safety Officer.

8. (C) Issuing Central Licenses to large-scale food business operators
The primary responsibilities of the state Commissioner of Food Safety include uniform implementation of standards, training personnel, and approving prosecutions. However, the task of issuing Central Licenses to large-scale food business operators falls under the direct purview of the central food authority and its designated central licensing officers, rather than any state-level official.

9. (D) Commissioner of Food Safety – Section 30
The statutory framework of the Food Safety and Standards Act assigns specific roles to distinct sections. Section thirty outlines the appointment, powers, and duties of the Commissioner of Food Safety. Conversely, the roles of the Designated Officer are governed by Section thirty-six, and

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29. (A) Notify the Designated Officer and keep the seized food items in secure custody.
Upon intercepting and seizing suspected misbranded food products, the Food Safety Officer must demonstrate legal compliance by immediately notifying the district Designated Officer. The FSO is required to keep the seized food items in secure custody to prevent tampering and preserve the chain of custody for any subsequent legal actions or testing.

30. (C) The processing of state-level licenses and sanctioning of new prosecutions encounter severe administrative delays.
Since the Designated Officer acts as the statutory licensing authority and the sole official empowered to sanction prosecutions at the district level, the prolonged absence of this officer leads to immediate administrative bottlenecks. Consequently, the processing of state-level licenses and the initiation of legal actions against violators face severe delays.

31. (C) Four parts
The Food Safety and Standards Rules mandate that when a Food Safety Officer draws a sample of food for analysis, the sample must be divided into four distinct parts. This division is crucial for maintaining procedural transparency, enabling independent analyses, and providing backup portions in case of legal disputes or referral testing.

32. (C) A is true but R is false.
The Food Safety Officer is granted the statutory power to enter and inspect any premises where food is manufactured, stored, or exhibited for sale at any reasonable time. The officer does not require a search warrant from a Judicial Magistrate prior to conducting routine inspections, making the assertion true but the reason false.

33. (B) One part is sent to the Food Analyst, two parts to the Designated Officer, and one part is kept by the FBO.
After drawing and dividing a food sample, the Food Safety Officer must dispatch one part to the Food Analyst for immediate testing. Two parts are sent to the district Designated Officer for safe custody, and the remaining single part is given to the Food Business Operator as an official record.

34. (D) The FSO can destroy the perishable food immediately if it is unfit for human consumption, after recording formal evidence.
For seized food items that are highly perishable and prone to rapid decay, the Food Safety Officer is empowered to destroy the products immediately if they are clearly unfit for human consumption. This action must be preceded by recording formal evidence and preparing a detailed inventory to maintain legal accountability.

35. (A) P-II, Q-III, R-I
The distribution of divided food sample parts follows a strict protocol. The first part is sent directly to the Food Analyst under intimation to the Designated Officer. The second and third parts are sent to the Designated Officer for safe custody, and the fourth part is retained for referral testing if requested.

36. (C) The FSO can arrest the Food Business Operator immediately without a warrant upon finding misbranded food.
While the Food Safety Officer is vested with extensive administrative powers, including searching premises, seizing non-compliant food, and breaking open packages, they do not possess the statutory authority to make immediate arrests without a warrant. Arrests and criminal prosecutions require formal judicial proceedings and are managed by police authorities.

37. (B) I, II, and IV only
During a seizure, the Food Safety Officer must prepare an inventory of the seized items, provide a formal receipt to the operator, and keep the articles in safe custody. However, the officer is not required to pay the market value of the seized adulterated food to the operator, as the food violates safety standards.

38. (D) Entering and inspecting a private residential house where absolutely no commercial food activities are run.
The statutory powers of a Food Safety Officer are limited to commercial activities. They can collect ingredient samples, seize relevant business books of account, and inspect food transport vehicles. However, they lack the legal authority to enter or inspect a private residential house where no commercial food operations are conducted.

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19. (A) The Designated Officer
Before a Food Safety Officer can legally launch a prosecution in a court of law for any food safety violation, the officer must obtain prior written sanction from the district Designated Officer. This requirement ensures administrative oversight and prevents arbitrary or legally weak prosecutions from being initiated without proper institutional review.

20. (A) P-III, Q-IV, R-I, S-II
The Food Safety and Standards Act maps administrative roles to distinct sections. Section thirty-six outlines the duties of the Designated Officer, while Section thirty-seven regulates the Food Safety Officer. Section sixty-eight establishes the role of the Adjudicating Officer, and Section thirty defines the appointment and powers of the state Commissioner.

21. (A) They have the sole authority to permanently ban a food product nationwide.
The administrative powers of a Designated Officer are restricted to their specific district. They cannot issue nationwide bans, as that authority rests solely with the central food authority. However, they are legally responsible for processing licenses, investigating complaints against field officers, and maintaining precise inspection records within their local jurisdiction.

22. (B) I, III, and IV only
Food Safety Officers must be appointed by notification and hold specific scientific qualifications. The Commissioner assigns their local areas of jurisdiction. However, to ensure absolute neutrality and prevent conflicts of interest, no person who possesses any direct or indirect financial interest in any food business can be appointed or function as an officer.

23. (B) Conducting physical and chemical analysis of food samples in laboratories
The Designated Officer holds administrative, regulatory, and supervisory powers, including issuing licenses, sanctioning prosecutions, and investigating complaints against field staff. However, they do not perform physical or chemical laboratory analysis of food samples. This technical task is the exclusive statutory duty of the qualified Food Analyst working in accredited laboratories.

24. (C) Designated Officer – Accountable to the Commissioner of Food Safety
The statutory hierarchy of food safety enforcement outlines clear lines of administrative accountability. The field-level Food Safety Officer is accountable to the district Designated Officer. In turn, the Designated Officer is directly accountable to the state-level Commissioner of Food Safety, who oversees the entire implementation of the regulatory framework within the state.

25. (D) Statement I is false but Statement II is true.
The physical collection of food samples from local markets is the statutory duty of the Food Safety Officer, not the Designated Officer. However, the Food Safety Officer does not operate independently; they are legally mandated to work under the direct administrative supervision, guidance, and control of the district-level Designated Officer.

26. (A) Recommend the matter to the Adjudicating Officer for imposing a financial penalty.
When a Food Analyst's report categorizes a sample as "sub-standard" but "safe," it represents a civil violation rather than a criminal offence. The Designated Officer must recommend the case to the Adjudicating Officer. This civil authority conducts inquiries and imposes financial penalties instead of launching criminal prosecutions in judicial courts.

27. (B) Commissioner of Food Safety – Must hold a doctorate degree in food microbiology
The regulations mandate specific qualifications for various food safety officials to ensure competence. However, the Commissioner of Food Safety is an administrative position, typically filled by a senior civil servant or government official, and there is no statutory requirement for them to hold a doctorate degree in food microbiology.

28. (B) Directing the uniform implementation of safety standards and supervising Food Safety Officers in the district.
At the district level, the primary administrative responsibility of the Designated Officer is to ensure the uniform implementation of food safety standards. This involves supervising the active Food Safety Officers, reviewing their inspection reports, managing local licensing, and ensuring that enforcement actions are conducted systematically and in full compliance with the law.

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(B) The Commissioner of Food Safety of the State
(C) The Chief Executive Officer of the central FSSAI
(D) The Food Safety Appellate Tribunal of the State

135. Cause: Implementation of mobile applications for FSOs to conduct and record real-time inspections.
Effect: Which of the following is the most significant outcome?
(A) A major increase in physical paperwork, leading to severe administrative delays in compiling inspection reports.
(B) Enhanced operational transparency, precise geo-tagging of active inspections, and reduced manipulation of data.
(C) The total elimination of active FSOs, who are replaced entirely by automated remote drones for facility checking.
(D) Complete decentralization of scientific food standard-setting, allowing each municipality to draft parallel rules.

136. Which organization releases the annual State Food Safety Index (SFSI) to evaluate the performance of States and UTs?
(A) Ministry of Agriculture
(B) NITI Aayog
(C) FSSAI
(D) Bureau of Indian Standards

137. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Assertion (A): The State Advisory Committee comprises representatives from consumer organizations and the food industry.
Reason (R): Engaging multiple stakeholders ensures holistic feedback and practical implementation of food safety regulations at the state level.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

138. Which of the following statements correctly lists the broad parameters evaluated under the State Food Safety Index (SFSI)?
(A) Human Resources, regulatory compliance, testing facilities, personnel training, and consumer empowerment.
(B) Agricultural crop output, annual rainfall patterns, international food export volumes, and localized GST collection.
(C) The absolute number of police arrests made, average duration of court disputes, and district police infrastructure.
(D) Overall regional population density, general adult literacy rates, and physical healthcare hospital infrastructure.

139. A State Food Authority wants to drastically improve its ranking in the State Food Safety Index (SFSI). Which of the following interventions will have the most significant positive impact on its score?
(A) Implementing a total ban on the physical entry of all processed food products manufactured outside the state.
(B) Expanding the network of NABL-accredited testing laboratories and establishing swift grievance redressal tools.
(C) Significantly reducing the total strength of active Food Safety Officers to minimize the state's budget deficit.
(D) Terminating all routine surveillance sampling programs to report an artificial statistic of zero adulteration.

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140. Match the SFSI parameters in List I with their corresponding evaluation metrics in List II.
List I: (SFSI parameters)
P. Human Resources and Institutional Data
Q. Compliance
R. Food Testing Infrastructure
S. Consumer Empowerment
List II: (Evaluation metrics)
I. Availability of NABL accredited labs and mobile testing vans
II. Participation in Eat Right initiatives and grievance redressal
III. Number of licenses issued, inspections conducted, and samples lifted
IV. Availability of full-time Designated Officers and FSOs
(A) P-IV, Q-III, R-I, S-II
(B) P-I, Q-II, R-III, S-IV
(C) P-IV, Q-I, R-III, S-II
(D) P-III, Q-IV, R-I, S-II

39. (B) Form V A – Official notice of intention to collect a sample for analysis
Under the administrative rules, specific forms are designated for enforcement procedures. Form five-A is the official notice of intention that a Food Safety Officer must issue to the Food Business Operator before collecting a food sample for analysis, ensuring that the sampling process complies with legal protocols.

40. (C) Statement I is true but Statement II is false.
The Food Safety Officer is legally required to offer the market price of the sample to the operator. However, if the operator refuses to accept the payment, the officer is still legally empowered to proceed with the sampling and testing process, making the assertion correct but the reason incorrect.

41. (A) 1, 3, 2, 4
The correct procedural sequence for drawing a legal sample begins with issuing Form five-A to declare the intention. Next, the officer pays the cost of the sample to the operator. The sample is then divided into four parts, which are finally sealed, labeled, and signed by all parties.

42. (A) Surveillance Sample – Legal sample taken strictly for prosecution purposes
A surveillance sample is drawn to gather market intelligence, identify risk trends, and map compliance levels rather than initiate immediate legal prosecutions. Conversely, legal samples, seizures, homogenization, and the addition of authorized preservatives are regulatory mechanisms strictly used to support formal enforcement actions and legal proceedings in courts.

43. (B) To guarantee operational transparency, facilitate reference testing during legal disputes, and secure backup samples.
Dividing an enforcement sample into four parts is a safeguard designed to ensure operational transparency. It provides independent portions for the initial analysis, the operator's record, and the Designated Officer's custody. This backup system allows for reference testing in appellate laboratories if the initial results are disputed during legal proceedings.

44. (B) The FSO is empowered to register a formal complaint for obstruction, which constitutes a punishable offence under the Act.
When a Food Business Operator obstructs a Food Safety Officer from entering the premises, the officer cannot use physical force. Instead, the officer is empowered to register a formal complaint. Under the Act, obstructing an enforcement officer is a punishable offense that carries specific penalties and legal liabilities.

45. (A) The sample may be officially rejected by the Food Analyst, significantly weakening the legal prosecution in court.
Proper sealing and labeling are critical to maintaining the chain of custody. If the Food Safety Officer fails to seal the container correctly, the Food Analyst may reject the sample due to risk of tampering. This procedural error can compromise the integrity of the evidence and weaken any subsequent prosecution.

46. (B) Rs. 12 lakhs
Under the licensing and registration regulations, the annual turnover threshold for petty food business operators is set at twelve lakh rupees. Operators whose annual turnover remains below this limit are only required to obtain a Registration Certificate, whereas those exceeding this threshold must apply for a formal license.

47. (C) A is true but R is false.
A food manufacturing unit with an annual turnover of fifteen crore rupees requires a State License, as it falls between the twelve lakh and twenty crore thresholds. However, State Licenses are issued by the Designated Officer acting as the licensing authority, not directly by the Commissioner, making the assertion true.

48. (C) It is the structured collection, analysis, and interpretation of food safety data to proactively manage risk and enforce rules.
A State-level surveillance plan is a systematic strategy designed to collect, analyze, and interpret food safety data across jurisdictions. This proactive approach helps authorities identify contamination trends, map high-risk food products, allocate enforcement resources efficiently, and manage risks before they escalate into widespread public health emergencies or outbreaks.

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69. (A) FoSCoS – Food safety compliance and licensing
The central food authority utilizes dedicated digital tools to streamline administrative operations. FoSCoS is the primary platform designed for licensing, registration, and compliance management. In contrast, INFoLNET is used for laboratory networking, and FoSTaC is the dedicated portal for organizing and tracking food safety training programs.

70. (C) Statement I is true but Statement II is false.
State Food Authorities rely on the central food authority to formulate and define scientific standards for food products. Under the cooperative federalism model, states are tasked with enforcing these standards. They do not possess the power to establish separate, parallel standards for food additives independent of the central regulations.

71. (B) 1, 2, 3, 4
Upgrading a State Food Testing Laboratory follows a structured sequence. First, the state identifies infrastructural gaps and submits a proposal to the central authority. Once funds are released, the state procures advanced testing equipment. Finally, laboratory staff undergo training, and the facility secures mandatory accreditation.

72. (C) Appointing Food Analysts for Referral Labs – Decided by the State Government
While standard setting is handled by the central authority, state licensing is managed by district Designated Officers, and laboratories are accredited by NABL. However, the appointment of Food Analysts for Referral Laboratories is decided by the central food authority, rather than individual State Governments, to ensure uniform scientific oversight.

73. (D) It ensures the technical competence, procedural impartiality, and global acceptability of laboratory test findings.
Mandatory accreditation ensures that State Food Testing Laboratories maintain high technical standards, operational impartiality, and rigorous quality control. This verification process ensures that analytical reports are scientifically accurate and legally defensible, preventing test findings from being successfully contested or dismissed in court due to procedural errors or poor testing practices.

74. (B) 14 days
According to the statutory guidelines under the Act, the Food Analyst is required to analyze a sample and send the analytical report to the Designated Officer within fourteen days of receiving it. This strict timeframe ensures that enforcement actions are initiated promptly and contaminated products are removed from the market.

75. (B) Analytical reports generated can be successfully contested and set aside in court, obstructing enforcement.
Operating a state laboratory without formal accreditation or modern equipment presents a major risk. Reports generated by such facilities can be easily contested and set aside by defense lawyers in court, which weakens prosecutions and undermines the state's ability to enforce food safety regulations and penalize violators.

76. (B) State Food Safety Authorities
Although inter-state commerce involves food products crossing borders, the physical enforcement of regulations, inspections, and sample collections within a state's territory remains the statutory responsibility of the respective State Food Safety Authority. These state-level officials enforce compliance under the provisions of the Food Safety and Standards Act.

77. (A) Both A and R are true and R is the correct explanation of A.
Tracing the origin of adulterated food moving across state borders is difficult for State Food Authorities. This challenge arises because individual Food Safety Officers have jurisdictions strictly limited to their assigned local areas within their state, meaning they cannot independently investigate or execute enforcement actions outside their state boundaries.

78. (C) FSSAI functions as the nodal agency to coordinate intelligence sharing and joint actions among state-level authorities.
In matters of inter-state food trade, the central food authority acts as the primary coordinating body. It facilitates intelligence sharing, manages rapid alerts, and organizes joint actions among different state authorities, ensuring that cross-border contamination issues are addressed cooperatively without disrupting domestic trade or exceeding local jurisdictional limits.

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59. (B) Instruct local FSOs to execute targeted legal sampling and strict enforcement checks in that specific area.
When surveillance data indicates high failure rates for a food product in a specific locality, the Designated Officer must take targeted action. Rather than banning products statewide, the officer should direct local Food Safety Officers to conduct rigorous legal sampling and enforcement checks in that area to address the issue.

60. (B) Highly efficient allocation of state enforcement assets toward elevated-risk products and localized adulteration hubs.
Implementing a robust, risk-based state surveillance plan allows authorities to direct their resources toward high-risk food products and geographic adulteration hubs. This systematic approach reduces wasted efforts on low-risk entities, optimizes the efficiency of state enforcement assets, and improves public safety through targeted monitoring and corrective actions.

61. (A) NABL
State food testing laboratories must be accredited by the National Accreditation Board for Testing and Calibration Laboratories to ensure test validity. This accreditation verifies that the facility satisfies technical competency standards, follows quality protocols, and generates accurate, scientifically reliable results that can withstand legal scrutiny during prosecutions.

62. (A) Both A and R are true and R is the correct explanation of A.
The central food authority provides substantial financial and technical assistance to upgrade State Food Testing Laboratories. This support is necessary because many state authorities lack the infrastructure and funding required to procure and maintain advanced analytical equipment, making both the assertion and reason accurate and logically linked.

63. (D) It serves as a collaborative forum for State Food Safety Commissioners to advise FSSAI on enforcement and standards.
The Central Advisory Committee acts as a primary coordination platform between the central food authority and the states. It brings together State Food Safety Commissioners, industry representatives, and consumer groups to advise the central body on enforcement strategies, resource allocation, and the practical implementation of national food safety standards.

64. (C) A Referral Food Laboratory
When a Food Business Operator disputes the analytical findings of a State Food Testing Laboratory, they can request appellate testing. Under the statutory provisions, the disputed sample is sent to a designated Referral Food Laboratory, whose analytical report supersedes the previous findings and serves as final evidence.

65. (A) P-III, Q-I, R-II
The laboratory network under the Act is divided into distinct functional tiers. Primary Laboratories conduct routine testing of enforcement samples. Referral Laboratories function as appellate bodies to resolve testing disputes, and National Reference Laboratories standardize analytical methodologies and organize proficiency testing across the country to ensure quality.

66. (D) Unaccredited state labs can still issue legally binding reports for criminal prosecutions indefinitely.
State food testing laboratories must maintain formal accreditation to ensure their findings are legally valid. Reports from unaccredited laboratories utilizing outdated methods can be successfully challenged in court, meaning they cannot issue legally binding reports for criminal prosecutions. Central schemes exist to upgrade facilities and address these structural issues.

67. (B) I, II, and III only
Effective central-state coordination is achieved through Central Advisory Committee meetings, capacity-building agreements, and digital portals like FoSCoS and INFoLNET. However, this does not involve transferring state enforcement powers to central officials, as states retain their constitutional authority to enforce regulations through local administrative officers.

68. (C) The Chief Justice of India
The Central Advisory Committee consists of representatives from diverse sectors, including State Food Safety Commissioners, food industry professionals, consumer organizations, and agricultural research institutions. However, the Chief Justice of India is a judicial official and does not serve as a member or participate in the administrative functions of this committee.

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49. (B) A Central License
According to the licensing and registration regulations, any Food Business Operator who has operations, manufacturing units, or branches in multiple states must obtain a Central License for their Head Office. This centralized licensing ensures uniform oversight and administrative compliance across all states where the business conducts its commercial operations.

50. (A) P-III, Q-II, R-I
The regulatory requirements for food businesses are structured according to their annual turnover. Businesses earning up to twelve lakh rupees require a Registration Certificate. Those with turnover between twelve lakhs and twenty crores need a State License, and operations exceeding twenty crores must obtain a Central License to ensure appropriate regulatory oversight.

51. (A) A petty food manufacturer is permitted to produce proprietary foods and novel foods without a license.
Petty food business operators are subject to simplified registration procedures and must display their certificates and follow basic hygiene rules. However, they are not permitted to manufacture proprietary or novel foods without obtaining a formal license, as these products require advanced scientific safety evaluations and central regulatory approval.

52. (A) I, II, and III only
Under the state-level licensing framework, the district Designated Officer acts as the Licensing Authority, issuing licenses valid for up to five years. Authorities can suspend licenses if the FBO fails to comply with an improvement notice. However, submitting a water testing report is a mandatory requirement for manufacturing units applying for a license.

53. (A) To trigger instant legal prosecution without laboratory analysis.
State-level food surveillance plans aim to map high-risk food items, identify seasonal trends, and guide enforcement policies. They are designed to collect data and assess risk, not to trigger instant prosecutions without laboratory analysis. Legal prosecutions require formal testing of enforcement samples to verify violations before filing cases.

54. (D) Form A – Basic application form used for registration certificates
The administrative rules establish standardized forms for licensing and registration. Form A is the basic application form utilized by petty food business operators to obtain a Registration Certificate. In contrast, Form B is used for state or central license applications, and Form C represents the final license document itself.

55. (C) Statement I is true but Statement II is false.
Samples collected under surveillance plans are intended for gathering market intelligence, identifying contamination hotspots, and monitoring overall compliance. However, an officer cannot use a surveillance report to file a criminal case directly in court; prosecutions require formal legal sampling and subsequent analysis according to statutory enforcement procedures.

56. (C) Submit a formal application to upgrade and convert their registration certificate into a State License.
When a registered petty food business operator expands and its annual turnover exceeds the twelve lakh rupees threshold, it must upgrade its regulatory status. The operator is required to submit a formal application to convert its existing registration certificate into a State License to maintain compliance with licensing laws.

57. (D) FSMS Plan – Document mandated for petty food vendors applying for basic registration
While blueprint layouts, executive director lists, and Form B applications are required for state-level licensing, a Food Safety Management System plan is not mandatory for petty food vendors. Petty vendors are only subject to basic hygiene guidelines, as FSMS plans are reserved for larger licensed manufacturing and processing facilities.

58. (A) To ensure the steady availability of safe, wholesome food products and safeguard overall public health.
The primary goal of executing state-level food surveillance and enforcement plans is to protect public health. These activities ensure that consumers have access to safe, wholesome food products by monitoring markets, detecting adulteration, and enforcing compliance among food business operators while preventing arbitrary shutdowns or disruption of the food supply chain.

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79. (D) State B should seize the products, and alert State A's Commissioner of Food Safety along with FSSAI for source-level action.
When contaminated food manufactured in State A is found in State B, the local officers in State B must seize the products to protect consumers. Since they lack jurisdiction in State A, they must alert State A's Commissioner and the central authority to initiate investigation and corrective action.

80. (A) P-III, Q-II, R-I
State-specific enforcement challenges require tailored mitigation strategies. Shortages of field officers are addressed by rationalizing jurisdictions and deploying mobile vans. Insufficient laboratory equipment is resolved using central funding schemes to upgrade facilities, and a fragmented unorganized sector is supported through targeted training and mass awareness campaigns.

81. (B) States are authorized to lower the national hygiene standards to accommodate poor street vendors permanently.
While states can deploy mobile testing vans, run seasonal surveillance drives, and hire contractual staff to manage resource shortages, they are not authorized to lower national safety or hygiene standards. National standards must be applied uniformly across all states to ensure consistent consumer protection and food quality.

82. (B) I, II, and IV only
State Food Authorities regularly face key operational challenges, including limited laboratory infrastructure, high pendency of cases in adjudication or judicial courts, and difficulties in monitoring the unorganized street food sector. Conversely, they rarely experience an abundance of technical manpower, as personnel shortages remain a persistent issue.

83. (A) Dealing with a massive surplus of funding and central grants.
Enforcing food safety involves addressing challenges like tracing loose unbranded commodities, managing inter-state recall logistics, and monitoring temporary food stalls during major public events. However, experiencing a massive surplus of funding is not a common challenge, as state enforcement bodies typically operate under tight budget constraints.

84. (C) FSSAI – Facilitates rapid alert systems between states
In the regulatory framework, the central food authority acts as the primary coordinator, facilitating rapid alert systems between different states. This connectivity allows state authorities to share information quickly regarding contaminated food shipments, coordinate recall procedures, and prevent the spread of foodborne illnesses across regional borders.

85. (C) Statement I is true but Statement II is false.
The state Commissioner of Food Safety possesses the statutory power to prohibit the entry and sale of an unsafe food product from another state for up to one year. However, such an order must be supported by scientific justification and risk assessments rather than arbitrary administrative decisions, making the first statement true.

86. (D) Establishing a Joint Task Force coordinated by FSSAI that involves the Food Safety Commissioners of the affected states.
To dismantle an adulteration racket operating across multiple states, independent local enforcement is insufficient. The most effective strategy is to establish a Joint Task Force coordinated by the central authority. This task force brings together the Food Safety Commissioners of the affected states to share intelligence and execute synchronized enforcement actions.

87. (B) Large unorganized sector – Easy implementation of full traceability
Enforcement challenges have direct negative impacts. Weak laboratory infrastructure delays reports, high case pendency reduces legal deterrence, and porous borders increase unmonitored food influx. However, a large unorganized sector complicates traceability, as small operators rarely maintain the detailed administrative records required to track supply chains.

88. (C) Intervention and active coordination by FSSAI central headquarters along with the Central Advisory Committee.
When serious disputes or overlapping investigations arise between different states, the most appropriate resolution mechanism is active intervention by the central food authority. Supported by the Central Advisory Committee, this central coordination resolves conflicts,

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and small retailers. Advance Training is intended for medium and large manufacturing units, and Special Training is customized for high-risk sectors like meat, dairy, or edible oil processing.

111. (D) ULBs can draft their own separate legal standards for food adulteration independent of FSSAI.
Urban Local Bodies assist state authorities by enforcing hygiene, providing market infrastructure, and supporting registration processes. However, they cannot draft separate legal standards for food adulteration. Standard-setting remains the exclusive statutory responsibility of the central food authority to ensure regulatory uniformity across the country.

112. (B) I, II, and III only
Every licensed food business must employ at least one certified Food Safety Supervisor trained under the FoSTaC program. This supervisor is responsible for implementing safety protocols within the establishment. However, these supervisors are employees of the food business and are not appointed or paid by the central authority.

113. (B) Issuing Central Licenses to multi-national food corporations
Urban Local Bodies support food safety by managing market infrastructure, assisting in registration, and providing hygiene facilities for slaughterhouses. However, they do not issue Central Licenses to multinational corporations. This licensing remains the exclusive statutory responsibility of the central food authority and its designated central licensing officers.

114. (D) Special FoSTaC (Dairy) – Technical mitigation of chemical and microbiological contaminants in milk and dairy products
Training levels under the FoSTaC system correspond to specific curricula. Special FoSTaC (Dairy) focuses on identifying and mitigating chemical and microbiological contaminants in milk and dairy products. This specialized training equips supervisors in high-risk sectors with the technical knowledge required to maintain product safety and regulatory compliance.

115. (C) Statement I is true but Statement II is false.
State governments can designate Panchayat Secretaries as Registering Authorities for petty food businesses. However, these local secretaries do not have the power to sentence violators to imprisonment. Criminal sentencing remains the exclusive responsibility of judicial courts, making the first statement true and the second statement false.

116. (C) Report the issue to the district Designated Officer and organize a structured FoSTaC training session for the vendors.
When a Gram Panchayat observes unhygienic practices among local sweet shops, it should take a constructive and legal approach. The Panchayat should report the matter to the district Designated Officer and coordinate a structured training session to educate vendors on hygiene standards and safe food-handling practices.

117. (A) Gram Panchayat – Issuing State Licenses for large factories
While the central authority sets standards, the Commissioner can issue prohibition orders, and the Designated Officer can sanction prosecutions. However, Gram Panchayats do not issue State Licenses for large factories. This administrative task is the responsibility of the designated state-level licensing authorities, making the first pair incorrect.

118. (D) By developing municipal market infrastructure like water and waste disposal networks while coordinating closely with local FSOs.
Urban Local Bodies support state food safety enforcement by improving municipal market infrastructure, including clean water access and waste disposal networks. Coordinating closely with local Food Safety Officers helps these municipal bodies ensure that local food markets maintain high hygiene and safety standards.

119. (B) Technical food safety knowledge combined with active inter-departmental cooperation to improve market infrastructure.
To improve hygiene in a local fish market, the Food Safety Officer must utilize their technical expertise and work collaboratively with the Municipal Health Officer. This inter-departmental cooperation allows authorities to upgrade market infrastructure and enforce safety standards without administrative friction or jurisdictional conflicts.

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hospitals. Conversely, BHOG targets places of worship, and Clean Street Food Hub focuses on clusters of popular local street food vendors.

100. (C) Statement I is true but Statement II is false.
State Food Authorities hold the responsibility for identifying clusters and conducting pre-audits for Clean Street Food Hub certification. However, the central authority does not bypass states to penalize individual vendors; instead, enforcement, monitoring, and penalty procedures remain the direct statutory responsibility of state-level officers, making the first statement true.

101. (A) 1, 2, 3, 4
The process of securing a Clean Street Food Hub certification follows a structured sequence. The State Food Authority first identifies a potential street food cluster. Next, they conduct a gap analysis and train vendors in hygiene. This is followed by a final audit by an accredited agency, resulting in the certification.

102. (D) Eat Right Station – Provides certifications for safe food practices at major airports exclusively
The Eat Right initiatives are defined by their target audiences. RUCO prevents cooking oil reuse, Hygiene Rating is a voluntary audit system, and BHOG enhances safety in places of worship. However, the Eat Right Station initiative targets railway stations rather than major airports to ensure passengers have access to safe food.

103. (B) To streamline registration, deliver hygiene training, and coordinate basic amenities like clean water and waste disposal.
The primary role of the state in regulating street food hygiene is to support vendors through registration, hygiene training, and coordinating basic amenities. By collaborating with local bodies, state authorities ensure access to clean water and waste disposal, improving food safety while keeping street food accessible and affordable.

104. (C) Compliance with wearing aprons and headgear, combined with the verified use of clean potable water
When inspecting a registered street food vendor within a Clean Street Food Hub, the Food Safety Officer focuses on practical hygiene compliance. Key assessment parameters include the proper use of protective aprons and headgear, clean food-handling practices, and the verified use of potable water for cooking and cleaning.

105. (D) Marked improvements in food handling, a decrease in microbiological contamination, and a solid rise in public consumer trust.
Delivering hygiene training to street food vendors through structured programs leads to improved food handling practices. It reduces microbiological contamination risks, enhances cleanliness, and increases consumer trust, which benefits both the vendors' livelihoods and the overall public health of the community.

106. (A) Food Safety Training and Certification
The acronym FoSTaC stands for Food Safety Training and Certification. This large-scale initiative offers structured training programs for food handlers across the food value chain, ensuring that businesses understand and comply with safety regulations, hygiene practices, and standard operating procedures.

107. (D) A is false but R is true.
Under the current regulatory framework, Urban Local Bodies do not have the power to issue food licensing certificates overriding the Designated Officer. The current Act supersedes previous municipal licensing powers, making the Designated Officer the sole licensing authority, which makes the assertion false but the reason true.

108. (B) They serve as registering authorities for local petty operators in some states and help conduct grassroots campaigns.
Gram Panchayats play a key role in rural food safety. They serve as registering authorities for local petty food operators in several states and help organize grassroots awareness campaigns. This local involvement ensures that safety regulations reach remote areas without imposing excessive administrative burdens on small-scale village traders.

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109. (A) The Gram Panchayat
For a widespread food safety awareness campaign in rural areas, the Gram Panchayat is the most effective local coordinator. Operating at the village level, this local government body has the direct community access required to organize campaigns, educate rural consumers, and encourage safe milk consumption practices.

110. (A) P-II, Q-III, R-I
Training programs under the FoSTaC system are tailored for different target groups. Basic Training is designed for petty operators, street vendors,

establishes clear operational jurisdictions, and ensures that cross-border enforcement is managed systematically and harmoniously.

89. (D) Yes, because the suspected consignment is physically present within that FSO's designated local area of jurisdiction.
A Food Safety Officer possesses the statutory power to inspect and seize any suspected consignment that is physically present within their designated local area of jurisdiction. It is irrelevant if the food product was manufactured or bottled in another state; the physical presence of the item enables local enforcement actions.

90. (A) The creation of regulatory safe havens for food adulterators in states characterized by weak enforcement systems.
Differing enforcement priorities and varying laboratory capacities among neighboring states can create regulatory safe havens. Adulterators may exploit these gaps by basing their operations in states with weak enforcement and shipping non-compliant products across porous borders, highlighting the need for harmonized regional testing and enforcement protocols.

91. (B) Eat Right India
The Clean Street Food Hub initiative is a key component of the Eat Right India campaign. This national movement focuses on improving food safety, promoting healthy diets, and encouraging sustainable food practices through collaborative efforts involving state food authorities, food business operators, and general consumers.

92. (D) A is false but R is true.
The Hygiene Rating Scheme is a voluntary audit and certification program rather than a mandatory requirement for all street food vendors. However, it successfully empowers consumers to make informed choices about where to eat by displaying ratings, making the assertion incorrect but the reason accurate.

93. (A) It encourages places of worship to adopt basic food safety and hygiene practices in the preparation of prasad.
The BHOG initiative is a structured program that encourages places of worship to adopt food safety and hygiene practices when preparing and distributing prasad. It focuses on training food handlers, improving kitchen cleanliness, and ensuring that offerings distributed to devotees satisfy basic health and safety standards.

94. (C) Clean Street Food Hub (CSFH) Certification
For a cluster of street food vendors operating in a local market, the State Food Safety Authority should encourage them to obtain the Clean Street Food Hub certification. This program enhances hygiene practices, improves local infrastructure, and provides a recognized safety certification that builds consumer confidence.

95. (A) P-II, Q-III, R-I
The Eat Right India campaign includes several initiatives with distinct targets. RUCO focuses on repurposing used cooking oil to produce biodiesel. BHOG ensures safe food practices in places of worship, and the Hygiene Rating Scheme rates restaurants and catering establishments based on hygiene and safety standards.

96. (C) It is strictly utilized to automatically cancel the licenses of 1-star rated restaurants.
The Hygiene Rating Scheme uses external audits to rate establishments on a scale of one to five. It promotes competition to improve standards and help consumers. However, it is not used to cancel licenses automatically; instead, lower-rated businesses receive guidance and improvement notices to correct hygiene deficiencies.

97. (A) I, II, and III only
Declaring a cluster as a Clean Street Food Hub requires satisfying specific criteria, including a minimum number of vendors, mandatory registration under the Act, and hygiene training for handlers. There is no requirement to ban non-vegetarian food, as the program focuses on safety and hygiene rather than dietary preferences.

98. (D) Swachh Vidyalaya Abhiyan
State authorities implement several food-focused initiatives, such as Eat Right Campus, Clean Street Food Hub, and the RUCO program for used cooking oil. However, Swachh Vidyalaya Abhiyan is a school sanitation campaign managed by education departments, rather than an initiative under the food safety regulatory framework.

99. (A) Eat Right Campus – Focuses on workplaces, schools, universities, and hospitals
Each food safety initiative targets specific audiences. Eat Right Campus is designed to promote safe, healthy, and sustainable food options in workplaces, schools, universities, and

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120. (C) Elevated risks of cross-contamination and persistent failure to satisfy the mandatory Schedule 4 safety criteria.
Operating a catering establishment without a trained Food Safety Supervisor increases the risk of cross-contamination and leads to consistent failures to satisfy Schedule four hygiene criteria. Without trained supervisors, staff may lack the knowledge required to implement critical hazard controls and maintain standard sanitary practices.

121. (D) FoSCoS
FoSCoS is the cloud-based, pan-India IT platform launched by the central food authority for food safety compliance, licensing, and registration. It replaced the older licensing system, offering a modern, product-mapped, and user-friendly digital interface that streamlines licensing and registration procedures for operators across the country.

122. (D) Unsafe food offences resulting in injury or death are criminal matters tried in judicial courts, not by Adjudicating Officers.
The Adjudicating Officer handles civil violations and imposes financial penalties. However, serious offenses involving unsafe food that results in injury or death are criminal matters. These cases are tried in judicial courts, meaning the assertion is incorrect but the reason is accurate.

123. (B) The Adjudicating Officer conducts formal inquiries and levies financial fines for civil violations like sub-standard products.
At the state level, the Adjudicating Officer conducts formal inquiries and imposes financial penalties for civil violations, such as selling sub-standard or misbranded food. This official does not handle serious criminal cases or draft national food standards, as their authority is limited to resolving civil infractions.

124. (B) The Adjudicating Officer
When a food sample is found to be "misbranded" but safe, it is classified as a civil infraction. The Food Safety Officer must file the case before the Adjudicating Officer, who is empowered to conduct inquiries and impose financial penalties for violations that do not involve criminal harm.

125. (A) P-II, Q-I, R-I, S-II
The legal framework directs offenses to different authorities based on their severity. Civil infractions, such as selling sub-standard food or publishing misleading advertisements, are handled by the Adjudicating Officer. Serious criminal offenses, including operating without a license or causing grievous injury, are tried in criminal courts.

126. (C) It is structured to allow members of the general public to arbitrarily cancel any active food business license without verification.
The FoSCoS portal provides a unified digital window for managing licenses, reducing the need for physical paperwork and integrating with other key systems. However, it does not allow the public to cancel active licenses arbitrarily; license suspension and cancellation remain the exclusive statutory responsibility of designated licensing officers.

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127. (B) I, II, and IV only
The Food Safety Appellate Tribunal hears appeals against decisions made by Adjudicating Officers. It is presided over by a District Judge and is designed to resolve civil disputes quickly. Its decisions are not final; they can be appealed further in the High Court of the concerned state.

128. (C) FoodTrak
The central food authority operates several digital platforms to support state-level enforcement, including INFoLNET for laboratory networking, FoSCoS for licensing and compliance, and Food Safety Connect for consumer complaints. However, FoodTrak is not an official platform under the regulatory framework, making it the correct exception.

129. (B) INFoLNET – Network that connects all accredited food testing laboratories
The digital tools utilized by the food safety system are designed for specific functions. INFoLNET connects accredited laboratories and manages analysis reports. In contrast, FoSCoS is used for licensing and compliance, and FoSTaC manages training programs, ensuring that different aspects of the system operate efficiently.

130. (A) Both Statement I and Statement II are true.
The Adjudicating Officer must hold a rank not below that of an Additional District Magistrate. This official possesses the powers of a civil court, which allows them to summon witnesses, require the production of documents, and conduct formal inquiries to resolve cases involving civil violations of the Act.

131. (A) 3, 4, 2, 1
The sequential steps in the adjudication process begin with the Designated Officer sanctioning the prosecution. The Food Safety Officer then files the case before the Adjudicating Officer. The Adjudicating Officer conducts an inquiry and issues an order, and the operator can appeal to the Appellate Tribunal if aggrieved.

132. (C) FoSTaC – Managing inter-state GST tax collection on food
While FoSCoS handles licensing, INFoLNET tracks laboratory reports, and Food Safety Connect manages consumer complaints, FoSTaC does not manage GST collection. FoSTaC is a dedicated portal used to coordinate food safety training and certification programs for food handlers, making the third pair incorrect.

133. (A) It shifts licensing from manual, text-box entries to standardized product-based categories, streamlining compliance.
Shifting from the old FLRS system to the FoSCoS platform streamlines compliance. By using standardized, product-based categories instead of manual text entries, the platform reduces errors, simplifies application procedures, and ensures that licensing requirements match the specific activities of food business operators across the country.

134. (D) The Food Safety Appellate Tribunal of the State
When a Food Business Operator is fined by the Adjudicating Officer and wishes to challenge the decision, they must appeal to the Food Safety Appellate Tribunal of the state. This judicial body is designated to hear and resolve appeals against orders issued by Adjudicating Officers.

135. (B) Enhanced operational transparency, precise geo-tagging of active inspections, and reduced manipulation of data.
Deploying mobile applications for FSOs to record inspections improves transparency. It enables precise geo-tagging, allows real-time data entry, and reduces potential data manipulation. This digital approach ensures that inspections are recorded accurately, which helps state authorities monitor compliance levels across different enforcement zones.

136. (C) FSSAI
The Food Safety and Standards Authority of India releases the annual State Food Safety Index. This index evaluates the performance of States and Union Territories across key food safety parameters, fostering competition and encouraging states to improve their enforcement infrastructure, training programs, and consumer awareness initiatives.

137. (A) Both A and R are true and R is the correct explanation of A.
The State Advisory Committee includes representatives from consumer organizations, government bodies, and the food industry. Engaging these stakeholders ensures holistic feedback and practical implementation of food safety regulations at the state level, making both the assertion and the reason accurate and logically linked.

138. (A) Human Resources, regulatory compliance, testing facilities, personnel training, and consumer empowerment.
The State Food Safety Index evaluates states using key performance indicators. These parameters include human resources, regulatory compliance, testing infrastructure, training and capacity building, and consumer empowerment. This comprehensive assessment ensures that states are evaluated on their overall ability to enforce safety regulations effectively.

139. (B) Expanding the network of NABL-accredited testing laboratories and establishing swift grievance redressal tools.
To improve its score in the State Food Safety Index, a State Food Authority should invest in critical infrastructure. Expanding the network of accredited testing laboratories and establishing efficient grievance redressal systems directly improves performance indicators, resulting in a higher score and better safety management.

140. (A) P-IV, Q-III, R-I, S-II
The State Food Safety Index measures performance across distinct parameters. Human Resources assesses the availability of full-time officers. Compliance measures inspections and licenses issued. Food Testing Infrastructure evaluates accredited laboratories and mobile vans, and Consumer Empowerment tracks participation in public safety initiatives and grievance systems.

141. (A) Rural markets rely exclusively on packaged food items from top multinational brands, removing all local adulteration risk.
Enforcing food safety in rural areas involves challenges like vast terrains and limited awareness

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among operators, which can lead to sub-standard products being sold. However, the claim that rural markets rely exclusively on multinational brands is incorrect, as loose and locally manufactured commodities remain highly common in these regions.

142. (B) I and III only
The State Advisory Committee advises the government on food safety matters and promotes cooperation among enforcement agencies, consumers, and industry. However, it does not draft national regulations for additives or monitor the performance of appellate tribunals, as those tasks are handled by central bodies and judicial authorities.

143. (D) Imposing indefinite blanket bans on raw agricultural commodities
High-performing states adopt effective practices like deploying mobile testing vans, organizing training, and establishing grievance portals. However, imposing blanket bans on raw agricultural commodities is not an approved practice, as it disrupts trade and food security without providing a science-based solution to safety issues.

144. (C) State Food Safety Index – Fosters a healthy, competitive ecosystem that catalyzes proactive state-level enforcement.
The State Food Safety Index plays a key role in national safety coordination. By ranking states, it creates a healthy, competitive ecosystem that encourages proactive state-level enforcement and infrastructure development, helping improve safety standards, laboratory capacities, and training programs across the country.

145. (C) Statement I is true but Statement II is false.
The State Food Safety Index is a performance measurement tool that evaluates safety management across states. However, poor performance does not result in a state losing its constitutional authority; instead, it highlights areas for improvement and directs central assistance to help the state upgrade its infrastructure, making the first statement true.

146. (D) Deploying Mobile Food Testing Vans (Food Safety on Wheels) to conduct on-the-spot analysis and run local awareness camps.
In large rural districts with scattered villages, traditional enforcement is often challenging. The most effective strategy is to deploy Mobile Food Testing Vans. These units conduct on-the-spot analyses, run public awareness campaigns, and educate small vendors, extending the reach of regulatory oversight to remote populations.

147. (A) Foreign Diplomats – Vetoing state food safety policies based on international trade
The State Advisory Committee includes diverse stakeholders, such as consumer organizations, industry representatives, and agricultural experts, to provide feedback. However, foreign diplomats do not serve on this committee or hold veto power over state food policies, as state regulations are governed strictly by domestic statutory frameworks.

148. (C) A highly dominant unorganized sector, loose sale of commodities, and extremely limited enforcement personnel for vast areas.
Enforcing food safety in rural areas is challenging due to several structural issues. These include a dominant unorganized sector, the loose sale of unbranded commodities, and a shortage of enforcement personnel to cover vast regions, making systematic monitoring and traceability more difficult than in urban centers.

149. (A) Analyzing shared surveillance data to collaboratively isolate food safety risks and elevate voluntary business compliance.
During stakeholder meetings, the Commissioner of Food Safety should prioritize using surveillance data to identify and address contamination risks. This collaborative approach helps businesses improve voluntary compliance and allows authorities to address safety concerns before they lead to regulatory violations or public health issues.

150. (D) The state gains national recognition, secures financial capacity-building rewards, and achieves high consumer trust in its food.
Achieving a top ranking in the State Food Safety Index provides significant benefits. The state gains national recognition, secures financial rewards for capacity-building, and builds strong consumer confidence in its food supply, which supports both the local economy and the public health of its citizens.

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CHAPTER 34

Public Health: Definition, History, Concepts and Determinants

1. Consider the following statements regarding the history of public health:
1. Ancient public health was primarily characterized by sanitation and hygiene practices.
2. The germ theory of disease shifted the focus toward individual clinical treatments exclusively.
3. Modern epidemiology emerged through studies like John Snow's investigation of cholera.
4. The sanitary awakening in the 19th century led to significant legislative health reforms.

Which of the statements given above are correct?
(A) 1, 2 and 3
(B) 1, 3 and 4
(C) 2, 3 and 4
(D) 1, 2, 3 and 4

2. Which of the following best represents the widely accepted definition of public health?
(A) The clinical science of diagnosing, treating, and managing individual patient illnesses within specialized hospital settings.
(B) The highly specialized branch of clinical medicine dealing exclusively with emergency pandemic management and control.
(C) The administrative and financial management of modern healthcare delivery facilities, private clinics, and hospitals.
(D) The science and art of preventing disease, prolonging life, and promoting health through organized community efforts.

3. Consider the following statements regarding the scope of public health:
Statement I: The primary focus of public health is on the health outcomes of populations rather than individual clinical care.
Statement II: Modern public health excludes environmental interventions and focuses entirely on immunization programs.
Which of the following is correct?
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

4. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): The Indus Valley Civilization provides early evidence of public health practices.
Reason (R): Archaeological excavations have revealed advanced drainage systems and planned sanitation facilities in these ancient cities.
Choose the correct option:
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

5. Which of the following statements correctly describes the transition from ancient sanitation to modern epidemiology?
(A) It transitioned from generalized sanitary improvements to targeted investigations of disease agents and modes of transmission.
(B) It involved a shift from studying disease transmission in populations back to religious explanations of illness.
(C) It was marked by the complete and permanent replacement of traditional hygiene practices with advanced pharmaceutical interventions.
(D) It relied exclusively on the microscopic identification of viruses before any public health action could be taken.

6. How is the "scope of public health" most accurately defined in contemporary practice?

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(A) A highly specialized medical practice restricted to the acute surgical management of infectious and communicable diseases.
(B) A localized and volunteer-driven community effort concerned solely with basic maternal care and child health outcomes.
(C) An environmental science focused exclusively on municipal pollution control without any consideration of human biology.
(D) A multidisciplinary field encompassing disease prevention, health promotion, environmental health, and health policy.

7. Match the historical public health milestones in List I with their key characteristics in List II:
List I: Historical public health milestones
P. Ancient sanitation
Q. Sanitary awakening
R. Germ theory
S. Modern epidemiology
List II: Key characteristics
I. Identification of specific disease-causing microorganisms
II. Organized drainage and waste disposal
III. Systematic study of disease distribution and determinants
IV. Industrial revolution era health reforms
(A) P-II, Q-IV, R-I, S-III
(B) P-I, Q-II, R-III, S-IV
(C) P-IV, Q-III, R-II, S-I
(D) P-II, Q-I, R-IV, S-III

8. Which of the following does NOT fall under the traditional scope of public health?
(A) Implementation of national vaccination programs
(B) Formulation of public health policies and regulations
(C) Performing individualized open-heart surgeries
(D) Monitoring environmental health hazards

9. What was the primary effect of the widespread acceptance of the germ theory on public health practices?
(A) It led directly to the complete abandonment of general community sanitation in favor of individualized reactive clinical care.
(B) It resulted in the immediate, global eradication of all major chronic and non-communicable diseases across human populations.
(C) It shifted public health focus entirely toward macro-level environmental degradation rather than localized infectious agents.
(D) It caused a shift toward specific preventive measures such as targeted disinfection, pasteurization, and immunizing vaccines.

10. Arrange the following milestones in the history of public health in chronological order:
1. The global eradication of smallpox
2. The establishment of ancient urban sanitation systems
3. The development of the germ theory of disease
4. The formulation of the Sustainable Development Goals (SDGs)
Which of the following is the correct chronological sequence?
(A) 2-3-1-4
(B) 2-1-3-4
(C) 3-2-1-4
(D) 3-1-2-4

11. Which of the following statements regarding the history of public health is incorrect?
(A) John Snow's work on cholera is considered a foundational moment in modern epidemiology.
(B) Ancient civilizations had no concept of public health or community hygiene.
(C) The industrial revolution initially worsened public health due to overcrowding, prompting later sanitary reforms.
(D) Modern epidemiology incorporates statistical analysis to trace disease outbreaks.

12. A Food Safety Officer discovers a cluster of foodborne illnesses linked to a specific municipal water source. Applying the core principles of modern epidemiology, what should be the immediate next step?
(A) Recommend immediate, individualized empirical antibiotic treatments for all residents living in the affected municipal zone.
(B) Analyze the geographic distribution of cases and investigate the source to implement targeted environmental control measures.
(C) Isolate all symptomatic individuals in medical facilities and completely ignore the environmental municipal water source.
(D) Wait for the natural, spontaneous resolution of the foodborne outbreak in the community before taking any regulatory action.

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26. Which of the following statements regarding the current scenario of disease burden is incorrect?
(A) Communicable diseases no longer pose any public health threat in developed nations.
(B) Mental health conditions constitute a significant and growing portion of the non-communicable disease burden.
(C) The burden of NCDs is disproportionately increasing in low- and middle-income countries.
(D) Lifestyle factors significantly drive the rise in non-communicable diseases globally.

27. As a Food Safety Officer, you observe an increase in diet-related NCDs (like hypertension) alongside sporadic outbreaks of foodborne infections in a community. How does this dual burden dictate your competency in regulatory enforcement?
(A) It requires completely ignoring infectious foodborne outbreaks since chronic non-communicable diseases cause much higher long-term community mortality.
(B) It requires prioritizing routine hygiene inspections while simultaneously enforcing regulations on mandatory trans-fat limits and sodium food labeling.
(C) It limits all statutory and regulatory enforcement actions strictly to the laboratory microscopic analysis of acute bacterial food pathogens.
(D) It shifts the entire regulatory and preventive responsibility away from food safety authorities to clinical medical doctors in private hospitals.

28. Which of the following factors was the most appropriate reason for the successful global eradication of smallpox?
(A) The biological existence of multiple animal reservoirs, including wild rodents and domesticated primates, which maintained virus latency.
(B) The global availability of a highly effective, heat-stable vaccine coupled with a complete lack of any non-human biological reservoirs.
(C) The widespread, exclusive deployment of advanced broad-spectrum clinical antibiotics across all symptomatic and asymptomatic populations.
(D) The natural, spontaneous genetic degradation of the viral strain over several centuries without requiring any active human intervention.

29. A developing country reports high hospital admissions for dengue fever alongside a rapidly rising incidence of cardiovascular disease in urban centers. This case perfectly illustrates which global health concept?
(A) The double burden of disease
(B) The iceberg phenomenon
(C) Primordial prevention
(D) Herd immunity

30. Identify the incorrect pair regarding global public health scenarios:
(A) Smallpox - Eradicated infectious disease
(B) NCDs - Driven by behavioral risk factors
(C) SDG Goal 3 - Focuses exclusively on eradicating poverty
(D) Double burden - Coexistence of undernutrition and overnutrition

31. Consider the following statements regarding the WHO definition of health:
1. Health is merely the absence of disease or infirmity.
2. The definition includes physical, mental, and social well-being.
3. The WHO definition has been criticized for being too broad and idealistic.
4. It emphasizes a positive state of well-being rather than a negative state of non-illness.

Which of the statements given above are correct?
(A) 1, 2 and 3
(B) 2, 3 and 4
(C) 1, 3 and 4
(D) 1, 2, 3 and 4

32. The World Health Organization (WHO) formally adopted its definition of health ("a state of complete physical, mental and social well-being...") in which year?
(A) 1948
(B) 1965
(C) 1978
(D) 2000

33. Consider the following statements regarding the dimensions of health:
Statement I: The spiritual dimension of health is strictly synonymous with regular participation in organized religious activities.
Statement II: The environmental dimension recognizes that an individual's health is closely

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tuberculosis, and waterborne cholera infections constitute the primary direct drivers of global NCD mortality.
(B) Severe micronutrient deficiencies, acute childhood starvation, and local food safety failures represent the sole significant drivers of the global NCD burden.
(C) Cardiovascular diseases, oncological cancers, chronic respiratory diseases, and diabetes mellitus account for the vast majority of global NCD deaths.
(D) Non-communicable diseases are primarily transmitted through biological vector-borne agents like mosquitoes and ticks thriving in tropical climates.

21. What does the term "epidemiological transition" define in the context of public health?
(A) A shift in disease patterns from high mortality due to infectious diseases to high morbidity and mortality from chronic, non-communicable diseases.
(B) The predictable seasonal and geographic fluctuation in the incidence rates of specific vector-borne parasitic illnesses in tropical regions.
(C) The biological process by which a novel virus genetically mutates to successfully infect and transmit within a completely different host species.
(D) The large-scale physical migration of actively infected populations across internationally recognized geopolitical borders during pandemics.

22. Match the global health milestones/concepts in List I with their descriptions in List II:
List I: Global health milestones/concepts
P. Smallpox eradication
Q. SDG Goal 3
R. Double burden of disease
S. Epidemiological transition
List II: Descriptions
I. Coexistence of infectious diseases and chronic diseases
II. Shift in major causes of death and illness
III. Achieved globally in 1980 via targeted vaccination
IV. Ensures healthy lives and promotes well-being
(A) P-III, Q-IV, R-I, S-II
(B) P-IV, Q-III, R-II, S-I
(C) P-III, Q-I, R-IV, S-II
(D) P-I, Q-IV, R-III, S-II

23. Which of the following is NOT typically classified as a major non-communicable disease (NCD) contributing to the current global disease burden?
(A) Type 2 Diabetes Mellitus
(B) Multidrug-resistant Tuberculosis (MDR-TB)
(C) Chronic Obstructive Pulmonary Disease (COPD)
(D) Cardiovascular disease

24. What is the primary cause-and-effect relationship driving the "double burden of malnutrition" in many developing countries?
(A) Unusually high sanitation standards and modern hygiene practices leading directly to both clinical obesity and infectious outbreaks simultaneously.
(B) A strict and unwavering adherence to traditional agricultural diets, which causes a rare state of simultaneous nutrient toxicity and deficiency.
(C) Rapid, unplanned urbanization and dietary shifts causing persistent undernutrition in some segments and obesity or diet-related NCDs in others.
(D) The complete and rapid eradication of all infectious environmental diseases leading directly to massive increases in inherited genetic disorders.

25. A public health policy maker is analyzing data showing high rates of both childhood stunting and adult obesity in the same geographic region. To address this scenario, which intervention applies the most comprehensive public health approach?
(A) Allocating national healthcare development funds exclusively to subsidizing advanced adult gastric bypass and bariatric surgeries.
(B) Distributing massive quantities of high-calorie refined food aid universally to all households without assessing its nutritional quality.
(C) Mandatorily isolating all stunted children in specialized clinical inpatient wards for long-term physiological and genetic monitoring.
(D) Implementing a food systems approach that promotes access to affordable, nutrient-dense foods while regulating ultra-processed foods.

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13. Which of the following is the most appropriate primary objective of public health?
(A) To prevent disease, prolong life, and promote population health through organized multi-sectoral community interventions.
(B) To develop specialized, high-cost therapies designed to cure rare genetic disorders using advanced gene-editing biotechnology.
(C) To provide end-of-life palliative care services exclusively to terminally ill patients admitted to specialized hospitals.
(D) To maximize the financial performance and long-term profitability of private clinical healthcare and insurance institutions.

14. During a localized outbreak of a gastrointestinal disease, public health officials notice that all affected individuals consumed food from a single vendor. The officials immediately suspend the vendor's operations and initiate a sanitation review. This action primarily demonstrates which aspect of public health?
(A) Tertiary prevention and rehabilitation
(B) Clinical diagnostics and precision medicine
(C) Environmental health regulation and disease control
(D) Primordial prevention of genetic diseases

15. Identify the correct pair representing a public health era and its primary focus:
(A) Miasma era - Focus on genetic screening
(B) Germ theory era - Focus on resolving chronic psychological stress
(C) Modern public health - Focus exclusively on localized clinical surgery
(D) Sanitary awakening - Focus on improving living and working conditions

16. Consider the following statements regarding global public health milestones:
1. Smallpox is the only human disease to have been globally eradicated through vaccination.
2. The eradication of smallpox was officially certified by the WHO in 1980.
3. The Sustainable Development Goals (SDGs) focus exclusively on communicable diseases.
4. SDG Goal 3 aims to ensure healthy lives and promote well-being for all at all ages.

Which of the statements given above are correct?
(A) 1, 2 and 3
(B) 1, 2 and 4
(C) 2, 3 and 4
(D) 1, 3 and 4

17. In which year did the World Health Assembly officially declare the global eradication of smallpox?
(A) 1970
(B) 1975
(C) 1980
(D) 1990

18. Consider the following statements regarding the current scenario of disease burden:
Statement I: Developing nations are currently facing a "double burden" of both communicable and non-communicable diseases.
Statement II: Non-communicable diseases (NCDs) have completely replaced communicable diseases globally, leaving zero incidence of infections.
Which of the following is correct?
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

19. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): There has been a global epidemiological transition shifting the primary burden of disease from infectious to non-communicable diseases (NCDs).
Reason (R): Improved sanitation, vaccination coverage, and changing lifestyle factors like diet and sedentary behavior have altered disease patterns.
Choose the correct option:
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

20. Which of the following statements correctly identifies the current major contributors to the global burden of non-communicable diseases (NCDs)?
(A) Infectious malaria outbreaks, pulmonary

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tied to the quality of their physical surroundings. Which of the following is correct?
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

34. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): The WHO definition implies that health is not merely the absence of disease or infirmity.
Reason (R): Health is viewed as a multidimensional state encompassing physical, mental, and social well-being, allowing individuals to lead socially and economically productive lives.
Choose the correct option:
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

35. Which of the following statements correctly highlights the mental dimension of health?
(A) It encompasses a state of balance between the individual and the surrounding world, including the capacity to cope with normal life stresses.
(B) It relies entirely and exclusively on the physical and structural integrity of the human anatomical organs and biological systems.
(C) It is defined strictly and measured solely by an individual's household socioeconomic status, educational attainment, and income level.
(D) It is only relevant and active as a concept when an individual has been formally and clinically diagnosed with a severe psychiatric disorder.

36. How is "social health" best defined within the dimensions of health?
(A) The absolute and complete physical absence of any contagious or communicable social diseases within a highly structured urban community.
(B) The personal economic and financial capacity to purchase comprehensive health insurance coverage from private or public medical providers.
(C) The ability to interact effectively with other people and the social environment, maintaining stable, satisfying interpersonal relationships.
(D) The psychological state of consistently having a positive emotional outlook and finding a higher moral or spiritual purpose in everyday life.

37. Match the dimensions of health in List I with their corresponding indicators or examples in List II:
List I: Dimensions of health
P. Physical health
Q. Mental health
R. Social health
S. Spiritual health
List II: Indicators or examples
I. Meaning and purpose in life
II. Integration and harmony in social relationships
III. Normal physiological functioning and organ capacity
IV. Emotional resilience and cognitive function
(A) P-III, Q-IV, R-II, S-I
(B) P-IV, Q-III, R-I, S-II
(C) P-III, Q-II, R-IV, S-I
(D) P-II, Q-IV, R-III, S-I

38. Which of the following was NOT explicitly included in the original 1948 WHO definition of health?
(A) Physical well-being
(B) Mental well-being
(C) Social well-being
(D) Spiritual well-being

39. What is the expected effect of severe environmental degradation (e.g., severe air and water pollution) on the dimensions of public health?
(A) It directly and universally enhances the social dimension of health by forcing immediate community cooperation and resource sharing.
(B) It leads directly to a severe decline in physical health outcomes due to increased incidence of respiratory illness and waterborne diseases.

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(C) It impacts only the subjective spiritual well-being of the population while leaving physical and physiological health completely unaffected.
(D) It significantly improves baseline mental health and psychological coping mechanisms by naturally increasing community-wide urban resilience.

40. Arrange the following steps in the logical operationalization of improving health dimensions at a community level:
1. Enhancing social support networks and community integration
2. Addressing basic physical health needs (clean water, nutrition)
3. Fostering environments that support mental and emotional well-being
4. Promoting self-actualization and spiritual fulfillment

Which of the following is the correct logical sequence?
(A) 2-1-3-4
(B) 1-2-3-4
(C) 2-3-1-4
(D) 4-3-2-1

41. Which of the following statements regarding the spiritual dimension of health is incorrect?
(A) It involves feeling a sense of purpose and meaning in life.
(B) It often includes holding deep personal values and ethical beliefs.
(C) It can contribute to an individual's resilience against mental and physical stress.
(D) It is universally defined by the medical community as adherence to a specific religion.

42. A Food Safety Officer is tasked with evaluating a corporate food production facility. Aside from checking hygiene, the FSO notes that workers are provided with highly nutritious meals, fair wages, stress-relief areas, and community-building activities. This facility is actively addressing which dimensions of health?
(A) Physical, mental, and social health
(B) Only physical health
(C) Only socioeconomic health
(D) Environmental and genetic health

43. Which of the following is the most appropriate criticism often leveled against the WHO definition of health?
(A) It places an excessive and scientifically narrow focus on analyzing the negative states of clinical illness and pathology.
(B) Its inclusion of the word 'complete' makes health practically unattainable and theoretically defines most of humanity as unhealthy.
(C) It totally and completely ignores the critical cognitive, emotional, and psychological mental aspects of human daily life.
(D) It is designed from a wealthy perspective that makes it applicable and useful only to highly developed, high-income nations.

44. An individual shows perfect results on all physiological laboratory tests and has no physical ailments, but feels deeply isolated, lacks close friends, and struggles to communicate with colleagues. According to the broad dimensions of health, this individual is primarily deficient in which dimension?
(A) Physical health
(B) Social health
(C) Spiritual health
(D) Environmental health

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45. Identify the correct pair representing a dimension of health and its core focus:
(A) Environmental health - Safe housing and clean air
(B) Physical health - Cognitive problem-solving skills
(C) Mental health - Range of joint mobility
(D) Social health - Deep personal philosophy of life

46. Consider the following statements regarding the iceberg phenomenon of disease:
1. The visible tip of the iceberg represents clinically apparent cases.
2. The submerged portion represents latent, inapparent, and sub-clinical cases.
3. The waterline represents the boundary between recognizable and unrecognized disease.
4. The iceberg phenomenon proves that all diseases have high mortality rates.

Which of the statements given above are correct?
(A) 1, 2 and 3
(B) 2, 3 and 4

(C) 1, 3 and 4
(D) 1, 2 and 4

47. In the "iceberg phenomenon of disease," what does the massive submerged portion of the iceberg primarily represent?
(A) The segment of the population that is completely and permanently immune to the specific biological pathogen.
(B) The cumulative historical register of all clinical patients who have already died from the disease's complications.
(C) The highly visible, severe clinical cases of active illness requiring immediate specialized emergency hospitalization.
(D) The vast pool of unrecognized, undiagnosed, sub-clinical, and asymptomatic cases currently existing in the community.

48. Consider the following statements regarding the natural history of disease:
Statement I: The stage of susceptibility precedes the onset of the actual pathological process.
Statement II: The clinical stage begins before any signs or symptoms are evident to the patient or physician.
Which of the following is correct?
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

49. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): The "waterline" in the iceberg phenomenon represents the threshold of clinical detection.
Reason (R): Cases above the waterline present with overt signs and symptoms, making them diagnosable by standard clinical methods.
Choose the correct option:
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

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50. Which of the following statements correctly describes the sub-clinical stage in the natural history of disease?
(A) It is the final, definitive stage where the clinical disease process resolves itself either through full recovery or patient death.
(B) The healthy individual is merely exposed to environmental risk factors without any internal cellular or physiological pathological changes.
(C) It is characterized by highly visible, severe, and disabling clinical symptoms that require immediate access to advanced tertiary care.
(D) Internal pathological changes are actively occurring in the body, but overt clinical signs and symptoms have not yet physically appeared.

51. How is the "iceberg phenomenon" defined in epidemiology?
(A) A conceptual model showing that only a small fraction of a disease's prevalence is clinically observable, while the vast majority remains hidden in the population.
(B) A thermodynamic model explaining the direct freezing effect of extreme winter temperatures on the environmental survival of airborne viral pathogens.
(C) A graphical, mathematical representation used to demonstrate rapidly declining infant mortality rates following clean water sanitation programs.
(D) A rare psychological condition and behavioral phenomenon where symptomatic patients actively hide their clinical symptoms from medical doctors.

52. Match the stages of the natural history of disease in List I with their key features in List II:
List I: Stages of the natural history of disease
P. Stage of susceptibility
Q. Sub-clinical stage
R. Clinical stage
S. Stage of resolution
List II: Key features
I. Onset of signs and symptoms
II. Exposure to risk factors, no pathology yet
III. Recovery, disability, or death
IV. Pathological changes without apparent symptoms
(A) P-II, Q-IV, R-I, S-III
(B) P-IV, Q-II, R-III, S-I
(C) P-I, Q-III, R-II, S-IV

(D) P-II, Q-I, R-IV, S-III

53. For which of the following conditions is the iceberg phenomenon generally NOT applicable (i.e., most cases are clinically apparent)?
(A) Rabies
(B) Polio
(C) Hypertension
(D) Type 2 Diabetes

54. What is the effect of having a large sub-clinical (submerged) population during an infectious disease outbreak without adequate screening?
(A) The active clinical cases admitted to local hospital wards resolve much faster because there are fewer symptomatic individuals seeking care.
(B) The infectious biological pathogen naturally and rapidly weakens its clinical virulence, completely disappearing from the localized ecosystem.
(C) The entire susceptible population immediately, spontaneously, and safely develops robust, long-term physiological and mucosal herd immunity.
(D) The infectious disease continues to transmit silently and undetected in communities, making coordinated public health outbreak control highly difficult.

55. Applying the concept of the natural history of disease to a chronic condition like atherosclerosis, at what stage would routine cholesterol screening be most effective for altering the disease course before a heart attack occurs?
(A) Stage of susceptibility
(B) Sub-clinical stage
(C) Advanced clinical stage
(D) Stage of resolution

56. Which of the following statements regarding the resolution stage of disease is incorrect?
(A) It can result in a carrier state.
(B) It can lead to long-term disability or impairment.
(C) It strictly implies full recovery and return to optimal health.
(D) It may culminate in the death of the host.

57. A public health worker intends to detect cases of a disease in a population before patients themselves recognize they are ill. To do this competently, the intervention must target individuals primarily in which stage?
(A) Stage of susceptibility
(B) Clinical stage
(C) Stage of resolution
(D) Sub-clinical stage

58. Which of the following concepts best describes the progression of a disease process in an individual over time, in the absence of treatment?
(A) Natural history of disease
(B) Iceberg phenomenon
(C) Epidemiological transition
(D) One Health approach

59. During a routine health camp, an individual is found to excrete Salmonella typhi in their feces but exhibits no fever or symptoms of typhoid. This case is an example of the hidden part of the iceberg phenomenon known as a:
(A) Susceptible host
(B) Carrier
(C) Clinical case
(D) False positive

60. Identify the incorrect pair regarding the iceberg phenomenon:
(A) Tip of the iceberg - Symptomatic, diagnosed clinical cases in medical systems
(B) Waterline - The division between recognized and unrecognized clinical disease
(C) Submerged portion - Undiagnosed, asymptomatic, and latent cases in the community
(D) Base of the iceberg - The vast, hidden pool of unrecognized community morbidity

61. Consider the following statements regarding the determinants of health:
1. Biological determinants include genetic makeup and aging.
2. Behavioural determinants involve lifestyle choices such as diet and physical activity.
3. Environmental determinants are exclusively limited to indoor air quality.
4. Socioeconomic determinants significantly impact a population's overall health status.

Which of the statements given above are correct?
(A) 1, 2 and 3
(B) 1, 2 and 4
(C) 2, 3 and 4
(D) 1, 3 and 4

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62. Which of the following is a classic example of a behavioural determinant of health?
(A) Chromosomal abnormalities
(B) Access to a clean municipal water supply
(C) Tobacco consumption
(D) The national inflation rate

63. Consider the following statements:
Statement I: Socioeconomic determinants of health include factors like education, employment, and income levels.
Statement II: Biological determinants are entirely modifiable through public health policies.
Which of the following is correct?
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

64. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Income level is a powerful socioeconomic determinant of health.
Reason (R): Higher income facilitates better nutrition, improved housing, access to healthcare, and reduced exposure to environmental hazards.
Choose the correct option:
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

65. Which of the following statements correctly describes genetic determinants of health?
(A) They are conscious, individual lifestyle choices and physical habits that directly and immediately alter genomic DNA sequences.
(B) They are inherent biological, hereditary factors that can predispose individuals to certain chronic diseases like sickle cell anemia.
(C) They dictate that environmental public health policy interventions and targeted educational programs are completely useless.
(D) They are determined primarily and directly by a person's formal educational attainment level and household income brackets.

66. How is a "determinant of health" fundamentally defined?
(A) A highly specialized clinical diagnostic laboratory test or imaging tool used exclusively to confirm an active infectious disease.
(B) A targeted medical prescription, pharmaceutical agent, or therapeutic drug regimen intended specifically to cure an inherited genetic condition.
(C) A state-level statutory regulatory body or government commission tasked with overseeing and licensing private hospital administrations.
(D) Any factor, whether personal, social, economic, or environmental, that directly or indirectly influences the health status of populations.

67. Match the category of health determinant in List I with the corresponding example in List II:
List I: Category of health determinant
P. Biological
Q. Behavioural
R. Socioeconomic
S. Environmental
List II: Example
I. Poor air quality
II. High levels of education
III. Inherited genetic mutation
IV. High-sugar diet
(A) P-III, Q-IV, R-II, S-I
(B) P-IV, Q-III, R-I, S-II
(C) P-III, Q-I, R-IV, S-II
(D) P-II, Q-IV, R-III, S-I

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68. Which of the following is NOT considered a biological determinant of health?
(A) Inherent chronological age
(B) Biological sex at birth
(C) Occupational hazard exposure
(D) Inherited genetic makeup

69. What is the expected effect of prolonged residence in overcrowded and damp housing (an environmental determinant) on public health?
(A) Increased population incidence rates of acute respiratory infections and common airborne communicable diseases.
(B) Significant improvements in neighborhood social cohesion, leading directly to zero

98. Which of the following is NOT an example of primary prevention?
(A) Screening for breast cancer via mammography
(B) Using seat belts to prevent injury
(C) Adding fluoride to the water supply
(D) Nutritional education on a balanced diet

99. What is the long-term effect of successfully implementing primordial prevention (e.g., culturally discouraging tobacco use) on disease incidence?
(A) Risk factors are entirely prevented from establishing in the population, leading directly to a profound, long-term decrease in the incidence of related NCDs.
(B) Individual risk factors multiply in society, but emergency clinical care significantly improves, thereby maintaining a completely stable disease incidence.
(C) It merely delays the clinical onset of the chronic disease in elderly individuals without altering the cumulative lifetime incidence rates in the population.
(D) It rapidly accelerates the pathological progression of the underlying sub-clinical disease directly toward the advanced clinical symptomatic stage.

100. Arrange the levels of prevention in the chronological order they would be applied along the natural history of a disease, from early to late:
1. Tertiary prevention
2. Primary prevention
3. Primordial prevention
4. Secondary prevention

Which of the following is the correct chronological sequence?
(A) 3-2-4-1
(B) 2-3-4-1
(C) 3-4-2-1
(D) 2-4-3-1

101. Which of the following statements regarding primordial prevention is incorrect?
(A) It focuses on altering broad societal and environmental conditions.
(B) It aims to prevent the emergence of risk factors.
(C) It is highly relevant for controlling the modern epidemic of obesity and diabetes.
(D) It is applied when risk factors are already highly prevalent in individuals.

102. As a public health planner looking to design an intervention for the primary prevention of nutritional anemia in pregnant women, which of the following is the most competent approach?
(A) Conducting high-cost, invasive, and massive blood transfusions for all clinically anemic pregnant women.
(B) Providing standardized oral iron and folic acid dietary supplementation as a form of specific protection proactively.
(C) Waiting for pregnant women to develop severe, life-threatening physical symptoms before conducting any testing.
(D) Focusing the entire community intervention budget exclusively on discouraging tobacco smoking among pregnant women.

103. What is the ultimate goal or "best answer" describing the objective of primary prevention?
(A) To halt the pathological progress of an active disease process at its earliest clinical incipient stage.
(B) To reduce the severe clinical complications and physical disabilities associated with an advanced disease.
(C) To prevent the initial biological occurrence or clinical onset of a disease within a healthy, susceptible population.
(D) To surgically remove heavily diseased or necrotic host tissues within a specialized tertiary care hospital.

104. A government introduces legislation to permanently ban the use of industrial trans-fats in all food production to prevent cardiovascular risk factors from entering the population's diet. This systemic, policy-level action is a classic case of:
(A) Secondary prevention
(B) Tertiary prevention
(C) Clinical rehabilitation
(D) Primordial prevention

105. Identify the correct pair representing an intervention and its level of prevention:
(A) National policy taxing sugary drinks - Primordial prevention
(B) Using condoms to prevent HIV - Secondary prevention
(C) Chemotherapy for advanced cancer - Primary prevention
(D) Sputum testing for TB diagnosis - Tertiary prevention

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(D) Implementing public health strategies that guarantee all diverse citizens will achieve the exact same biological chronological lifespan.

78. Consider the following statements:
Statement I: Food security exists when all people have physical and economic access to sufficient, safe, and nutritious food.
Statement II: Food security is purely an agricultural issue and is not considered a socioeconomic determinant of health.
Which of the following is correct?
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

79. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Higher levels of maternal education are consistently linked to better child health outcomes.
Reason (R): Educated mothers are generally more empowered to seek proper nutrition, employ hygienic practices, and utilize healthcare services for their children.
Choose the correct option:
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

80. Which of the following statements correctly identifies the role of employment as a determinant of health?
(A) Secured employment only affects personal health outcomes by providing access to corporate-sponsored clinical health insurance.
(B) The physical safety of occupational working conditions has no measurable, statistically significant impact on community life expectancy.
(C) Safe and secure employment provides critical financial stability, social support networks, and positive self-esteem, enhancing overall health.
(D) Chronic unemployment generally leads to improved long-term mental health outcomes due to the complete reduction of occupational stress.

81. What is the fundamental difference between health inequality and health inequity?
(A) Inequality is strictly driven by genetic and biological factors, whereas inequity is purely caused by physical environmental variables.
(B) Inequality refers to any descriptive difference in health status, while inequity refers to differences that are socially unjust and unfair.
(C) There is no functional difference between the two concepts; both terms are used completely interchangeably in modern epidemiology.
(D) Inequality represents a fully avoidable social scenario, whereas inequity is a biologically pre-determined and unavoidable genetic reality.

82. Match the pillars of food security in List I with their descriptions in List II:
List I: Pillars of food security
P. Availability
Q. Access
R. Utilization
S. Stability
List II: Descriptions
I. Consistent food supply over time without fluctuations
II. Sufficient quantities of food supplied on a consistent basis
III. Sufficient resources and purchasing power to obtain food
IV. Biological capacity of the body to process nutrients effectively
(A) P-II, Q-III, R-IV, S-I
(B) P-III, Q-II, R-I, S-IV
(C) P-IV, Q-I, R-II, S-III
(D) P-I, Q-IV, R-III, S-II

83. Which of the following is NOT one of the generally recognized core pillars of food security?
(A) Food homogenization
(B) Food availability
(C) Food accessibility
(D) Food utilization

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84. What is the well-documented effect of severe income inequality on population health disparities?
(A) It significantly decreases baseline health disparities as lower-income population segments naturally adapt to scarcer dietary resources.
(B) It directly causes the wealthiest socio-economic individuals to suffer from the highest community rates of acute communicable diseases.
(C) It leads directly to a steep social gradient in health, where lower-income groups consistently suffer higher morbidity and lower life expectancy.
(D) It uniformly and rapidly improves the baseline physical health of the entire nation due to the associated macro-level economic growth.

85. A policy planner wants to apply the concept of health equity to reduce diet-related diseases in a marginalized urban area. Which intervention best aligns with this goal?
(A) Implementing a flat-rate tax system that targets all municipal retail foods equally, regardless of their nutritional profile or value.
(B) Providing free educational brochures written in complex clinical medical jargon without making any structural changes to the local food system.
(C) Banning the commercial sale of all processed food within the urban area to forcibly encourage residents to relocate to rural organic farms.
(D) Subsidizing fresh fruits and vegetables specifically within low-income neighborhoods and systematically improving local grocery infrastructure.

86. Which of the following statements regarding the "social gradient in health" is incorrect?
(A) It refers to the step-wise decrease in health outcomes as socioeconomic position decreases.
(B) It is only observed in low-income, developing nations.
(C) It demonstrates that health inequities affect everyone, not just the poorest.
(D) It implies that individuals higher on the social ladder typically enjoy better health and longer lives.

87. A Food Safety Officer encounters a community termed a "food desert," where residents have no access to affordable, nutritious food, leading to severe nutritional deficiencies. Competently addressing this requires inter-sectoral collaboration to improve which specific determinant?
(A) Inherent individual biological and cellular determinants
(B) State-sponsored hereditary and genetic screening protocols
(C) Environmental determinants of food supply and physical access
(D) Hospital-based reactive clinical pharmaceutical distribution

88. Which is the most appropriate description of how food security acts as a socioeconomic determinant of health?
(A) It ensures that only highly processed, shelf-stable, and calorie-dense food products are heavily subsidized and distributed to low-income populations.
(B) It focuses strictly and exclusively on teaching individual citizens how to prepare meals, while deliberately ignoring the retail cost of local foods.
(C) It merely acts as an economic policy to ensure that national agricultural food exports are prioritized and maximized to increase corporate profits.
(D) Reliable access to nutritious food prevents both undernutrition and diet-related chronic diseases, heavily influencing overall population health.

89. A study shows that individuals living in a low-income neighborhood have a life expectancy 10 years lower than those in a high-income neighborhood in the same city. This scenario is a classic demonstration of:
(A) Health inequity driven by social determinants
(B) Biologically pre-determined human destiny
(C) The classic clinical iceberg phenomenon
(D) A systemic tertiary prevention failure

90. Identify the incorrect pair regarding socioeconomic concepts in health:
(A) Income - Determines purchasing power for health resources
(B) Health inequity - Genetically unavoidable differences in lifespan
(C) Education - Influences health literacy and

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healthy behaviors
(D) Social gradient - Health outcomes correlating with social status

91. Consider the following statements regarding primordial prevention:
1. It aims to prevent the development of risk factors in a population where they have not yet appeared.
2. It primarily targets underlying socioeconomic and cultural environments.
3. Early diagnosis and prompt treatment are its main interventions.
4. National policies promoting healthy diets in children are an example.

Which of the statements given above are correct?
(A) 1, 2 and 3
(B) 1, 2 and 4
(C) 2, 3 and 4
(D) 1, 3 and 4

92. The two main modes of intervention in primary prevention are:
(A) Health promotion and specific protection
(B) Early diagnosis and treatment
(C) Disability limitation and rehabilitation
(D) Screening and palliative care

93. Consider the following statements:
Statement I: Administering a vaccine to prevent polio is an example of health promotion.
Statement II: Administering a vaccine is an example of specific protection under primary prevention.
Which of the following is correct?
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

94. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Primordial prevention is particularly crucial in the fight against chronic non-communicable diseases (NCDs).
Reason (R): Primordial prevention intercepts the emergence of lifestyle-related risk factors (like smoking and obesity) before they become established in a population.
Choose the correct option:
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

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95. Which of the following statements correctly classifies routine childhood immunization?
(A) It is an administrative form of primordial prevention.
(B) It is a clinical form of active secondary prevention.
(C) It is a form of primary prevention (specific protection).
(D) It is an advanced form of reactive tertiary prevention.

96. How is "specific protection" defined in the context of primary prevention?
(A) Broad, non-specific societal interventions aimed at elevating the baseline physiological health status of the general public.
(B) Targeted, science-based measures aimed at preventing a specific disease or group of diseases by directly intercepting their known causes.
(C) The long-term medical and occupational rehabilitation of a clinical patient suffering from a severe, irreversible physical disability.
(D) Systematically altering the overarching historical cultural norms and economic behaviors of an entire national population.

97. Match the preventive interventions in List I with the corresponding level of prevention in List II:
List I: Preventive interventions
P. Banning fast-food advertisements targeted at children
Q. Fortification of salt with iodine
R. Pap smear screening for cervical cancer
S. Providing physical therapy after a stroke
List II: Levels of prevention
I. Primordial prevention
II. Primary prevention
III. Secondary prevention
IV. Tertiary prevention
(A) P-I, Q-II, R-III, S-IV
(B) P-II, Q-I, R-III, S-IV
(C) P-I, Q-III, R-II, S-IV
(D) P-IV, Q-III, R-II, S-I

S. Psychological rehabilitation

List II: Focus areas

I. Restoring a person's earning capacity and job skills

II. Restoring bodily function through physical therapy or prosthetics

III. Restoring self-esteem and coping with depression post-illness

IV. Reintegrating the individual into family and community relationships

(A) P-II, Q-I, R-IV, S-III

(B) P-I, Q-II, R-III, S-IV

(C) P-IV, Q-III, R-II, S-I

(D) P-II, Q-IV, R-I, S-III

113. According to the classic Wilson-Jungner principles, which of the following is NOT a valid criterion for implementing a screening program?

(A) The natural history of the condition must be adequately understood.

(B) The test should be acceptable to the population.

(C) The cost of case-finding should be economically balanced in relation to possible expenditure on medical care as a whole.

(D) The disease must be extremely rare with no known treatment.

114. What is the desired epidemiological effect of an effective secondary prevention (screening) program for a fatal disease?

(A) An increase in detected prevalence during the early phase, followed eventually by a significant reduction in disease-specific mortality.

(B) A rapid and permanent decrease in population disease incidence coupled with a subsequent, unexpected increase in case mortality rates.

(C) The immediate, absolute global eradication of the underlying biological pathogen from all environmental and human host reservoirs.

(D) A sudden, fundamental epidemiological shift of the disease's transmission mode from non-communicable to highly infectious or communicable.

115. A new biomarker is discovered for a rapidly fatal neurodegenerative disease that currently has no treatment, cure, or palliative options. Applying the Wilson-Jungner criteria, would it be appropriate to launch a mass screening program for this disease?

(A) Yes, because detecting any latent pathological disease early is always clinically beneficial, regardless of whether a medical treatment exists.

(B) Yes, because the clinical scenario clearly satisfies the critical primary criterion of representing an extremely important community health problem.

(C) No, because there is currently no accepted, effective treatment available for patients with recognized disease, directly violating a core criterion.

(D) No, because invasive blood biomarker tests are never under any socio-cultural circumstances acceptable to a healthy, asymptomatic population.

116. Which of the following statements regarding tertiary prevention is incorrect?

(A) It is primarily aimed at reversing the disease process back to the stage of complete susceptibility.

(B) It is applied systematically when the active disease process has already advanced beyond its early clinical stages.

(C) Its primary clinical goal is to effectively reduce long-term physical impairments and permanent functional disabilities.

(D) It aims to minimize patient suffering and actively promote clinical adjustment to late-stage, incurable conditions.

117. An FSO is reviewing a proposed workplace program testing all employees for early signs of occupational hearing loss. To ensure the program is scientifically valid under screening principles, the FSO must confirm that:

(A) The diagnostic screening test is highly complex, extremely invasive, and routinely takes several weeks to yield actionable laboratory results.

(B) The occupational hearing loss being screened is already clinically permanent, completely irreversible, and untreatable by any medical means.

(C) Only corporate employees who are already exhibiting profound, clinically certified bilateral deafness are selected to undergo the screening.

(D) The condition has a clearly recognizable sub-clinical early stage, and early intervention like protective equipment actively alters the prognosis.

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106. Consider the following statements regarding the Wilson-Jungner criteria for screening:
1. The condition should be an important health problem.
2. There should be a recognizable latent or early symptomatic stage.
3. Treatment at the asymptomatic stage should offer no advantage over treatment at the clinical stage.
4. There should be an accepted treatment for patients with recognized disease.

Which of the statements given above are correct?
(A) 1, 2 and 3
(B) 1, 2 and 4
(C) 2, 3 and 4
(D) 1, 3 and 4

107. What is the primary objective of secondary prevention?
(A) To prevent any initial physical exposure of a healthy population to an active environmental infectious agent.
(B) To halt the progress of a disease at its earliest incipient stage through rapid, early diagnosis and prompt clinical treatment.
(C) To completely and permanently rehabilitate clinical patients suffering from chronic, irreversible physical paralysis.
(D) To systematically improve the overarching macro-level socioeconomic status and educational literacy of the population.

108. Consider the following statements:
Statement I: Tertiary prevention includes both disability limitation and rehabilitation.
Statement II: Tertiary prevention interventions are applied during the pre-pathogenesis phase of a disease.
Which of the following is correct?
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

109. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): Early diagnosis and prompt treatment constitute secondary prevention.
Reason (R): These actions prevent the onset of the disease by intercepting the agent before it enters the host.
Choose the correct option:
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

110. Which of the following statements correctly defines "disability limitation" in public health?
(A) It is a broad primordial process focused strictly on preventing chronic behavioral risk factors from ever developing in a healthy society.
(B) It refers exclusively to the mandatory use of personal protective equipment and structural safety guards by healthy industrial workers.
(C) It is a classical primary prevention method that relies heavily on mass childhood vaccination programs to establish population immunity.
(D) It involves clinical interventions aimed at halting a disease process that has crossed early detection, preventing transition into severe impairment.

111. How is "screening" defined in the context of public health prevention?
(A) The definitive and conclusive clinical diagnostic testing of a symptomatic patient presenting with severe, acute physical symptoms.
(B) The immediate, active surgical removal of pre-cancerous tissues or localized benign tumors within a specialized tertiary hospital.
(C) The presumptive identification of unrecognized disease or defect by the rapid application of tests to a seemingly healthy, asymptomatic population.
(D) The statutory regulatory process of mandatorily isolating highly contagious, symptomatic individuals within a secure quarantine facility.

112. Match the types of rehabilitation in List I with their focus areas in List II:
List I: Types of rehabilitation
P. Medical rehabilitation
Q. Vocational rehabilitation
R. Social rehabilitation

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laws during an active global infectious pandemic.
(C) The comprehensive process of enabling communities and individuals to increase control over, and to significantly improve, their own health.
(D) The retrospective statistical tracking, demographic modeling, and reporting of crude mortality rates within a highly specific sub-population.

126. How is the "Epidemiological Triad" defined?
(A) A modern theoretical model of health promotion detailing three distinct political and advocacy-based community health strategies.
(B) A structured clinical framework illustrating the three sequential stages of pharmaceutical treatment in acute secondary care.
(C) The identification of the three primary, macro-level socioeconomic and agricultural factors driving national food insecurity.
(D) A traditional model of disease causation depicting the ongoing interaction between the active agent, the host, and the environment.

127. Match the components of the epidemiological triad in List I with their examples in List II:
List I: Components of the epidemiological triad
P. Agent (Biological)
Q. Agent (Nutritional)
R. Host factor
S. Environmental factor
List II: Examples
I. Extreme temperature/humidity
II. Age and genetic susceptibility
III. Influenza virus
IV. Severe Vitamin C deficiency
(A) P-III, Q-IV, R-II, S-I
(B) P-IV, Q-III, R-I, S-II
(C) P-III, Q-II, R-IV, S-I
(D) P-I, Q-II, R-III, S-IV

128. Which of the following is NOT one of the five key action areas of the Ottawa Charter for Health Promotion?
(A) Building healthy public policy
(B) Expanding private insurance monopolies
(C) Creating supportive environments
(D) Developing individual personal skills

129. In the context of the epidemiological triad for malaria, what is the direct effect of draining stagnant water bodies (an environmental change) on disease causation?
(A) It permanently and biologically alters human host genetics, making populations naturally immune and highly resistant to the clinical disease.
(B) It rapidly kills the active plasmodium parasite directly within the human bloodstream without requiring any clinical pharmaceutical therapy.
(C) It strictly and positively modifies the baseline nutritional status of the human host, preventing any clinical symptoms from manifesting.
(D) It eliminates the environmental breeding ground for the vector, thereby preventing the biological agent from successfully reaching the host.

130. Arrange the following actions in a sequence that reflects moving from broad health promotion policy down to individual empowerment (following Ottawa Charter concepts):
1. Building healthy public policy (e.g., national sugar tax)
2. Creating supportive environments (e.g., safe parks for exercise)
3. Strengthening community action (e.g., local community gardens)
4. Developing personal skills (e.g., individual cooking classes)
Which of the following is the correct logical sequence?
(A) 1-2-3-4
(B) 4-3-2-1
(C) 2-1-4-3
(D) 1-3-2-4

131. Which of the following statements regarding 'Host' factors in the epidemiological triad is incorrect?
(A) They include demographic factors such as age and sex.
(B) They include biological factors such as immune status and genetic traits.
(C) They include the physical climate and geography of the region.
(D) They include behavioral factors like lifestyle and diet.

132. An FSO aims to reduce foodborne illnesses in a district. Applying the Ottawa Charter's action

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118. Which is the most appropriate foundational principle of the Wilson-Jungner criteria?
(A) Screening is designed to be merely an epidemiological data-gathering exercise without any requirement for providing subsequent clinical follow-up.
(B) Screening should only be undertaken if it leads to a clear, proven benefit for the individuals being screened through effective and early treatment.
(C) Screening should be legally mandatory for every single known biological or genetic condition, regardless of prevalence, cost, or clinical severity.
(D) Screening programs should always prioritize extremely rare genetic diseases over highly common, high-burden population-wide health problems.

119. A patient recovering from a severe stroke is provided with speech therapy, physical therapy, and a customized wheelchair to help them return to a modified working environment. This case is a practical example of:
(A) Primary prevention (Specific protection)
(B) Secondary prevention (Early diagnosis)
(C) Tertiary prevention (Rehabilitation)
(D) Primordial prevention

120. Identify the incorrect pair regarding the levels of prevention and their associated activities:
(A) Secondary prevention - Mammography for breast cancer
(B) Tertiary prevention - Vocational retraining for an amputee
(C) Secondary prevention - Strict isolation of an infectious tuberculosis patient to treat them early
(D) Tertiary prevention - Mandatory fortification of flour with iron to prevent anemia

121. Consider the following statements regarding the Ottawa Charter for Health Promotion:
1. It was established in 1986.
2. Building healthy public policy is one of its core action areas.
3. It focuses solely on treating diseases within a hospital setting.
4. Strengthening community action is emphasized as a key strategy.

Which of the statements given above are correct?
(A) 1, 2 and 3
(B) 1, 2 and 4
(C) 2, 3 and 4
(D) 1, 3 and 4

122. In which year was the landmark Ottawa Charter for Health Promotion adopted?
(A) 1978
(B) 1986
(C) 2000
(D) 2015

123. Consider the following statements regarding the Epidemiological Triad:
Statement I: The 'Host' refers to the human or animal that harbors the disease.
Statement II: The 'Agent' is exclusively defined as a biological microorganism like a virus or bacteria.
Which of the following is correct?
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

124. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): In the epidemiological triad, modifying the environment can effectively break the chain of disease transmission.
Reason (R): The environment provides the conditions that allow the agent to survive, multiply, and reach a susceptible host.
Choose the correct option:
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

125. Which of the following statements correctly defines health promotion as outlined by the Ottawa Charter?
(A) The highly specialized, reactive clinical and medical treatment of late-stage terminal illnesses within intensive care hospital settings.
(B) The strict statutory enforcement of national quarantine and mandatory border isolation

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chronic clinical morbidity.
(C) Immediate, localized somatic genetic mutations that directly cause severe, inherited physical clinical disorders.
(D) A direct, measurable reduction in adverse individual behavioral risk factors such as heavy tobacco smoking.

70. Arrange the following determinants from the most "upstream" (macro/societal level) to the most "downstream" (individual biological level) according to ecological models of health:
1. National socioeconomic and environmental conditions
2. Living and working conditions (housing, agriculture)
3. Individual lifestyle and behavioural factors
4. Age, sex, and constitutional (genetic) factors

Which of the following is the correct sequence from upstream to downstream?
(A) 1-2-3-4
(B) 4-3-2-1
(C) 1-3-2-4
(D) 2-1-4-3

71. Which of the following statements regarding behavioural determinants is incorrect?
(A) They include habits such as physical activity and dietary patterns.
(B) They are entirely independent of an individual's socioeconomic status.
(C) They can be modified through health education and policy interventions.
(D) They play a major role in the development of non-communicable diseases.

72. A Food Safety Officer analyzing a local community's health profile notes high rates of malnutrition. Upon investigation, they find that fresh produce is unavailable in local stores, and residents rely on cheap, processed foods. To address this competently, the FSO must recognize this issue primarily as a failure of which determinant?
(A) Inherent individual biological factors
(B) Predetermined genomic and genetic factors
(C) Socioeconomic and food environment factors
(D) Reactive clinical and surgical treatments

73. Which of the following determinants is generally considered to have the most profound overall impact on the health status of a population?
(A) Availability of advanced tertiary care hospitals
(B) Genetic predispositions
(C) Clinical screening frequency
(D) Socioeconomic factors (e.g., income, education)

74. A middle-aged man develops type 2 diabetes primarily due to years of physical inactivity and a diet high in refined carbohydrates. This case strongly highlights the influence of which health determinant?
(A) Behavioural determinant
(B) Biological determinant
(C) Environmental determinant
(D) Infectious agent determinant

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75. Identify the correct pair representing a determinant of health and a specific influencing factor:
(A) Environmental - Educational curriculum
(B) Socioeconomic - Employment status
(C) Biological - Alcohol consumption
(D) Behavioural - Ambient air pollution

76. Consider the following statements regarding the social determinants of health (SDH):
1. They are the conditions in which people are born, grow, live, work, and age.
2. SDH are mostly responsible for health inequities seen globally.
3. Access to nutritious food is recognized as a key social determinant.
4. SDH have no bearing on the incidence of infectious diseases.

Which of the statements given above are correct?
(A) 1, 2 and 3
(B) 1, 3 and 4
(C) 2, 3 and 4
(D) 1, 2, 3 and 4

77. How is "health equity" best described in the context of public health?
(A) The absence of socially unjust, unfair, and avoidable or remediable differences in health among different community and social groups.
(B) Ensuring that every citizen in society receives exactly the same clinical medical treatment regardless of their underlying disease.
(C) Distributing municipal secondary hospital beds equally among different regional geographic zones and political voting districts.

area of "creating supportive environments," which is the most competent intervention?
(A) Mandating and subsidizing the installation of cold storage units and clean water stations in all local commercial food retail markets.
(B) Handing out generic educational pamphlets on personal hygiene and handwashing strictly to actively sick clinical patients after diagnosis.
(C) Focusing local municipal regulatory efforts solely on heavily penalizing micro-vendors after a severe foodborne outbreak has already occurred.
(D) Reorienting district health clinical services exclusively towards managing acute gastrointestinal cases within secondary care hospitals.

133. Which of the following represents the most appropriate or core philosophy underlying health promotion?
(A) Health is primarily and fundamentally a clinical medical responsibility, driven and managed almost entirely by licensed physicians.
(B) Health promotion is exclusively and narrowly concerned with proactive disease avoidance through preventive pharmaceutical medication.
(C) Health promotion focuses its entire strategic resource portfolio on directly modifying the hereditary genetic code of a human population.
(D) Health is actively created and lived by people within the settings of their everyday life, specifically where they learn, work, play, and love.

134. During an outbreak of cholera, analysts discover that the Vibrio cholerae bacteria is spreading rapidly among malnourished children in a flooded refugee camp. Applying the epidemiological triad to this case, which factor represents the 'Environment'?
(A) The active biological agent, Vibrio cholerae bacteria
(B) The flooded physical conditions and poor sanitation in the camp
(C) The underlying malnourished physical state of the host children
(D) The genetic immune response of the infected host children

135. Identify the correct pair matching an Ottawa Charter strategy with its practical action:
(A) Developing personal skills - Enacting and strictly enforcing national legislation regarding mandatory vehicle seatbelt laws.
(B) Building healthy public policy - An individual voluntarily choosing to quit smoking without any social policy incentives.
(C) Reorienting health services - Shifting institutional focus from clinical cure to broad community-wide disease prevention programs.
(D) Strengthening community action - A clinical medical doctor prescribing specialized cholesterol medication to a single patient.

136. Consider the following statements regarding the "One Health" approach:
1. It recognizes that human health is closely connected to the health of animals and our shared environment.
2. It is highly relevant for addressing zoonotic diseases.
3. It promotes isolated, discipline-specific interventions over collaborative efforts.
4. Antimicrobial resistance (AMR) is a major focus area of One Health.

Which of the statements given above are correct?
(A) 1, 2 and 3
(B) 1, 2 and 4
(C) 2, 3 and 4
(D) 1, 3 and 4

137. Which of the following is the primary focus of Sustainable Development Goal (SDG) 3?
(A) Ensure healthy lives and promote physical and mental well-being for all individuals at all ages.
(B) Provide inclusive and equitable quality education and lifelong learning opportunities for all.
(C) Achieve comprehensive gender equality and empower all women and girls globally.
(D) Ensure availability and sustainable management of clean water and sanitation for all.

138. Consider the following statements regarding Universal Health Coverage (UHC):
Statement I: UHC means that all individuals and communities receive the health services they need without suffering financial hardship.
Statement II: UHC guarantees that every

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affects communities, households, and even individuals, requiring highly integrated and comprehensive public health interventions.

25. (D) Implementing a food systems approach that promotes access to affordable, nutrient-dense foods while regulating ultra-processed foods.
Addressing the coexistence of childhood stunting and adult obesity requires a comprehensive food systems approach. Implementing policies that increase the availability and affordability of fresh, nutrient-dense foods while restricting or regulating high-fat, high-sugar ultra-processed foods directly targets the shared environmental drivers of malnutrition. This structural intervention is far more effective than relying on clinical, individual-level surgeries.

26. (A) Communicable diseases no longer pose any public health threat in developed nations.
Although developed nations have undergone the epidemiological transition, infectious diseases continue to pose significant public health threats. Seasonal influenza, foodborne pathogen outbreaks, healthcare-associated infections, and emerging viral pathogens require ongoing surveillance, vaccination programs, and environmental control measures. Therefore, infectious diseases remain a critical concern alongside the high prevalence of chronic, lifestyle-related non-communicable conditions.

27. (B) It requires prioritizing routine hygiene inspections while simultaneously enforcing regulations on mandatory trans-fat limits and sodium food labeling.
Managing communities experiencing both infectious foodborne diseases and high rates of chronic conditions requires a dual regulatory focus. Food safety officers must maintain strict hygiene inspections to prevent acute microbial contamination while simultaneously enforcing trans-fat bans and sodium labeling regulations. This balanced approach protects populations from immediate biological hazards and long-term cardiovascular risks.

28. (B) The global availability of a highly effective, heat-stable vaccine coupled with a complete lack of any non-human biological reservoirs.
The successful eradication of smallpox was driven by key biological and technical factors, notably the development of a highly effective, heat-stable vaccine. Furthermore, the smallpox virus lacks animal reservoirs, meaning it can only survive and replicate within human hosts. This allowed targeted surveillance and containment vaccination strategies to permanently break the global chain of transmission.

29. (A) The double burden of disease
The simultaneous occurrence of high infectious disease rates, such as vector-borne dengue fever, alongside rising chronic non-communicable conditions, like cardiovascular disease, illustrates the double burden of disease. This phenomenon is highly prevalent in rapidly developing nations undergoing transition. It strains available medical resources by requiring health systems to manage acute infections and complex chronic illnesses concurrently.

30. (C) SDG Goal 3 - Focuses exclusively on eradicating poverty
While poverty reduction is the primary focus of Sustainable Development Goal One, Goal Three is dedicated to ensuring healthy lives and promoting well-being for all at all ages. Goal Three addresses key health indicators, including maternal and child mortality, infectious diseases, non-communicable illnesses, substance abuse, and universal health coverage, rather than focusing solely on economic poverty indicators.

31. (B) 2, 3 and 4
The World Health Organization defines health as a state of complete physical, mental, and social well-being, rather than simply the absence of disease. Although this definition is criticized for being overly idealistic, it shifted focus toward positive well-being. This broader perspective emphasizes that health is a multidimensional resource necessary for leading productive, fulfilling lives.

32. (A) 1948
The World Health Organization formally adopted its landmark definition of health in its constitution, which entered into force in nineteen-forty-eight. This historical declaration established that health encompasses complete physical, mental, and social well-being, rather than merely the absence of disease or infirmity. It has guided global health policy, health promotion, and social welfare programs for decades.

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leading to isolated and strictly human-hosted resistance.
(B) The extensive use of antimicrobials in human medicine and livestock agriculture, driving the development and spread of resistant pathogens across environments.
(C) The complete and natural absence of common environmental bacteria, which unexpectedly causes human biological hosts to lose their natural mucosal immunity.
(D) The severe global lack of preventive vaccines for infectious viral diseases, which directly leads to the biological mutation of bacterial superbugs.

145. An FSO is dealing with a surge of a foodborne zoonotic pathogen (e.g., Salmonella) linked to poultry. Applying the One Health framework, what is the most comprehensive intervention?
(A) Focusing exclusively on medically treating individual human clinical patients presenting with severe gastrointestinal symptoms in acute care hospitals.
(B) Enacting immediate, sweeping national legislation to permanently ban the sale and commercial distribution of all livestock and poultry meat products.
(C) Focusing purely on the genetic sequencing of the human patients.
(D) Collaborating across veterinary, environmental, and human health sectors to improve farm hygiene, test water runoff, and monitor active clinical cases.

146. Which of the following statements regarding Universal Health Coverage (UHC) is incorrect?
(A) It requires out-of-pocket payments to be the primary funding mechanism for healthcare.
(B) It aims to ensure access to high-quality essential health services.
(C) It includes health promotion, prevention, treatment, rehabilitation, and palliation.
(D) It aims to protect individuals from being pushed into poverty due to healthcare costs.

147. A Food Safety Officer discovers that agricultural pesticide runoff is contaminating a local river, causing die-offs in local fish populations and subsequent neurological symptoms in humans consuming the water. Utilizing the One Health approach, the FSO demonstrates competency by:
(A) Recommending isolated and reactive clinical treatments for affected human patients while completely ignoring the ecological contamination of the river.
(B) Publicly blaming local citizens for making poor dietary and lifestyle choices without conducting any scientific investigation of the environmental toxin.
(C) Initiating a coordinated inter-sectoral response involving environmental protection, fisheries, and human health authorities to remediate the source.
(D) Issuing a basic municipal food safety advisory telling local citizens to continue eating the dead river fish as long as they are thoroughly boiled first.

148. Which statement best describes why improving global nutrition is inextricably linked to achieving Universal Health Coverage (UHC) and SDG 3?
(A) Nutrition acts as primordial and primary prevention, drastically reducing the downstream disease burden and making health systems financially sustainable.
(B) Proper dietary nutrition represents a highly expensive lifestyle intervention that ultimately drives national healthcare and hospital costs significantly up.
(C) Nutritional therapeutic interventions can only be safely administered by highly specialized clinical medical doctors within advanced tertiary hospital settings.
(D) Adhering to optimal dietary nutrition scientifically guarantees that individuals will never require any medical treatments or healthcare services in their lifetime.

149. During an outbreak of Highly Pathogenic Avian Influenza (HPAI), authorities manage the crisis by culling infected flocks, monitoring farm workers for symptoms, and restricting the movement of wild birds where possible. This coordinated case management is a prime example of:
(A) The Iceberg phenomenon
(B) Tertiary prevention
(C) Disability limitation
(D) The One Health approach

150. Identify the incorrect pair regarding public health paradigms and their focus:
(A) Ottawa Charter - Empowering communities and building healthy public policy
(B) One Health - Siloed, human-only clinical treatment approaches

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with chronic illness and life challenges, regardless of their specific religious affiliations.

42. (A) Physical, mental, and social health
Providing nutritious meals, fair wages, stress-relief areas, and community-building activities in a workplace addresses physical, mental, and social health dimensions simultaneously. Nutritious food supports physical well-being, while stress-relief programs foster emotional resilience. Community activities strengthen social connections, demonstrating how occupational environments can be structured to support comprehensive wellness rather than focusing solely on physical safety.

43. (B) Its inclusion of the word 'complete' makes health practically unattainable and theoretically defines most of humanity as unhealthy.
A common criticism of the World Health Organization's definition of health is its use of the word "complete." Critics argue that demanding complete physical, mental, and social well-being makes health an unattainable state for most people. This idealistic standard classifies individuals with minor chronic conditions or temporary stresses as unhealthy, reducing the definition's utility.

44. (B) Social health
An individual with normal physical test results who experiences deep isolation, lack of friendships, and communication struggles is primarily deficient in social health. This dimension reflects the ability to form meaningful relationships, feel a sense of social belonging, and interact effectively with others. Social isolation can negatively impact overall well-being, highlighting that health requires social integration.

45. (A) Environmental health - Safe housing and clean air
Environmental health focuses on the physical, chemical, and biological factors external to a person that can affect health, notably safe housing and clean air. This pairing is correct, as environmental conditions directly influence disease transmission and chronic exposures. In contrast, joint mobility relates to physical health, cognitive skills to mental health, and personal philosophy to spiritual well-being.

46. (A) 1, 2 and 3
The iceberg phenomenon of disease describes how clinical cases represent only the visible tip of a larger population health issue. The submerged portion consists of undetected, asymptomatic, and latent cases, while the waterline represents the threshold of clinical visibility. This model applies to many chronic and infectious diseases, though it does not imply that all conditions cause high mortality.

47. (D) The vast pool of unrecognized, undiagnosed, sub-clinical, and asymptomatic cases currently existing in the community.
In the iceberg phenomenon of disease, the large submerged portion represents unrecognized, undiagnosed, sub-clinical, and asymptomatic cases within the community. These individuals carry the condition but have not sought medical care or received a diagnosis. Identifying this hidden segment is a major challenge in public health, as asymptomatic carriers can continue to transmit infections or experience worsening chronic illness.

48. (C) Statement I is correct but Statement II is incorrect.
In the natural history of disease, the stage of susceptibility occurs before pathological changes begin, characterized by exposure to risk factors. The clinical stage, however, starts only when recognizable signs and symptoms manifest, rather than during the preceding sub-clinical phase. Thus, the onset of symptoms marks the transition from sub-clinical pathology to the clinical stage of disease.

49. (A) Both A and R are true and R is the correct explanation of A.
The waterline in the iceberg phenomenon represents the threshold of clinical detection, separating apparent illness from undetected cases. Cases above this line present with overt symptoms, making them diagnosable through standard clinical methods. This model highlights that relying solely on clinical presentations misses the large, asymptomatic population beneath the waterline, which requires targeted screening and active surveillance.

50. (D) Internal pathological changes are actively occurring in the body, but overt clinical signs and symptoms have not yet physically appeared.
The sub-clinical stage in the natural history of disease is characterized by active, internal pathological changes occurring within the host, without visible signs or symptoms. This phase, often called the incubation or induction period,

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ANSWERS

1. (B) 1, 3 and 4
The history of public health shows that ancient societies prioritized basic sanitation and waste management. During the nineteenth century, the sanitary awakening prompted critical legislative reforms to address deplorable living conditions. Modern epidemiology was subsequently established through pioneering studies like John Snow's investigation of cholera, whereas germ theory expanded public health focus beyond individual clinical treatments.

2. (D) The science and art of preventing disease, prolonging life, and promoting health through organized community efforts.
Public health is broadly characterized as both a science and an art dedicated to protecting and improving population health. This discipline achieves its goals through systemic community action, policy development, education, and organized efforts. It focuses on collective wellness and disease prevention across entire societies, distinct from clinical medicine which prioritizes individual medical treatments.

3. (C) Statement I is correct but Statement II is incorrect.
The primary focus of public health is addressing the well-being of entire populations rather than treating individual clinical cases. Modern public health encompasses diverse environmental interventions, health policies, and education, rather than restricting itself to immunization campaigns. Therefore, population outcomes remain the core concern while environmental management represents an indispensable element of comprehensive systemic health interventions.

4. (A) Both A and R are true and R is the correct explanation of A.
Archaeological evidence from the Indus Valley Civilization demonstrates that ancient urban centers implemented advanced sanitation practices. Excavations at sites like Harappa and Mohenjo-daro revealed highly sophisticated covered drainage systems, public baths, and planned streets. These early infrastructure developments confirm that organized community hygiene and waste disposal systems existed several millennia before modern sanitary regulations.

5. (A) It transitioned from generalized sanitary improvements to targeted investigations of disease agents and modes of transmission.
Public health practice shifted from early, generalized environmental sanitation efforts to the systematic scientific study of specific pathogens and transmission pathways. This evolution allowed practitioners to develop highly targeted interventions, immunizations, and containment protocols. Understanding the precise microbial causes and demographic distribution of diseases replaced the older, vague theories of atmospheric contagion and miasma.

6. (D) A multidisciplinary field encompassing disease prevention, health promotion, environmental health, and health policy.
Contemporary public health operates as a broad, multidisciplinary field that integrates diverse sectors to safeguard community well-being. This scope extends far beyond basic sanitation to encompass modern health policy, environmental monitoring, educational programming, and systemic disease prevention. It addresses behavioral, ecological, and structural factors influencing health outcomes across global populations rather than focusing solely on clinical medicine.

7. (A) P-II, Q-IV, R-I, S-III
Public health history is structured by key milestones that defined its modern trajectory. Ancient civilizations developed early drainage and waste disposal systems, while the nineteenth-century sanitary awakening drove legislative urban reforms. The acceptance of germ theory identified specific disease-causing pathogens, and modern epidemiology established the systematic study of disease distribution and determinants across diverse human populations.

8. (C) Performing individualized open-heart surgeries
Public health focuses on population-level preventive measures, environmental health regulations, and systemic policy formulation

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to protect entire communities. In contrast, performing highly complex, individualized clinical procedures, such as open-heart surgeries, belongs strictly to the domain of specialized tertiary clinical medicine. This clinical practice aims to treat existing disease in single patients rather than preventing population-level illnesses.

9. (D) It caused a shift toward specific preventive measures such as targeted disinfection, pasteurization, and immunizing vaccines.
The acceptance of germ theory revolutionized sanitary science by linking infectious diseases to specific microscopic pathogens. This understanding allowed public health officials to design highly effective, target-specific interventions, including disinfection protocols, pasteurization of food products, and protective vaccinations. These precise microbial control measures significantly enhanced community disease prevention, supplementing general environmental hygiene and sanitation campaigns.

10. (A) 2-3-1-4
The milestones of public health follow a clear chronological progression over human history. Ancient civilizations first established sophisticated urban drainage systems. Centuries later, scientific advances led to the development of germ theory. This foundation enabled the global eradication of smallpox, certified in nineteen-eighty, which eventually preceded the collaborative modern formulation of the global Sustainable Development Goals.

11. (B) Ancient civilizations had no concept of public health or community hygiene.
Historical evidence contradicts the claim that early human societies lacked hygiene concepts, as multiple ancient civilizations possessed highly developed sanitation systems. Cities within the Indus Valley, ancient Rome, and Egypt incorporated complex drainage, clean water supply channels, and waste management practices. These archaeological findings demonstrate that organized community hygiene was understood and implemented thousands of years ago.

12. (B) Analyze the geographic distribution of cases and investigate the source to implement targeted environmental control measures.
Investigating a foodborne disease cluster requires analyzing spatial distribution patterns to locate the specific contaminated source. Identifying the precise environmental point of exposure allows public health officials to enact swift regulatory and corrective actions to prevent further cases. This population-focused epidemiological approach is crucial for breaking transmission chains, far exceeding the impact of relying solely on individual clinical treatments.

13. (A) To prevent disease, prolong life, and promote population health through organized multi-sectoral community interventions.
The fundamental objective of public health centers on preventing disease, extending life expectancy, and promoting physical and mental well-being. This is achieved by organizing multi-sectoral community efforts, implementing environmental safeguards, and establishing protective health policies. These comprehensive measures target entire groups and communities, contrasting with clinical healthcare systems that focus on treating individual acute illnesses.

14. (C) Environmental health regulation and disease control
Suspending a compromised food vendor's operations during an active outbreak represents a classic application of environmental health regulation and disease control. This immediate administrative action removes the active source of exposure from the community to prevent further transmission. Such regulatory interventions prioritize population-level safety by monitoring, inspecting, and managing environmental factors that contribute directly to infectious diseases.

15. (D) Sanitary awakening - Focus on improving living and working conditions
The sanitary awakening of the nineteenth century represented a pivotal era focused on improving deplorable living and working conditions. This period recognized that overcrowding, poor waste management, and contaminated water directly drove high mortality rates. Implementing urban infrastructure reforms and environmental hygiene regulations during this era laid the foundation for modern public health policies and population-level interventions.

16. (B) 1, 2 and 4
Smallpox remains the only human infectious disease officially eradicated globally through a coordinated worldwide vaccination campaign. This historic milestone was certified by the World Health Organization in nineteen-eighty.

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While modern frameworks like the Sustainable Development Goals address infectious diseases, Goal Three targets broader health outcomes, including physical well-being, maternal care, and non-communicable diseases for all ages.

17. (C) 1980
The World Health Assembly officially declared the global eradication of smallpox in nineteen-eighty, following a highly coordinated international vaccination and surveillance campaign. This landmark achievement marked the first time humanity successfully eliminated a major infectious disease through deliberate, global public health efforts. It established a powerful precedent for subsequent disease control, immunization, and eradication strategies worldwide.

18. (C) Statement I is correct but Statement II is incorrect.
Developing nations face a challenging double burden characterized by the persistence of infectious diseases alongside rising rates of non-communicable diseases. Although chronic conditions like cardiovascular disease and diabetes are increasing globally, communicable infections have not been eliminated. Both categories of disease continue to present significant, simultaneous public health challenges that strain modern healthcare infrastructures in resource-limited settings.

19. (A) Both A and R are true and R is the correct explanation of A.
The global epidemiological transition describes a profound shift in population health patterns, where chronic non-communicable conditions replace infectious diseases as primary causes of death. This shift is driven by extensive improvements in sanitation, water quality, and vaccination coverage, combined with changing modern lifestyle behaviors. Consequently, rising sedentary habits and dietary alterations have escalated cardiovascular and metabolic diseases.

20. (C) Cardiovascular diseases, oncological cancers, chronic respiratory diseases, and diabetes mellitus account for the vast majority of global NCD deaths.
Non-communicable diseases constitute the leading cause of global mortality, driven primarily by four major conditions: cardiovascular diseases, cancers, chronic respiratory illnesses, and diabetes. These chronic ailments are linked by shared behavioral risk factors, including tobacco use, physical inactivity, unhealthy diets, and alcohol consumption. Addressing these conditions requires comprehensive, population-level lifestyle interventions and structural policy reforms.

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21. (A) A shift in disease patterns from high mortality due to infectious diseases to high morbidity and mortality from chronic, non-communicable diseases.
The concept of epidemiological transition defines the historical shift in a population's disease profile as socioeconomic conditions improve. This process is characterized by a transition from high mortality rates caused by infectious diseases and nutritional deficiencies to high morbidity and mortality from chronic, non-communicable conditions. These changes alter healthcare needs, requiring a focus on long-term disease management.

22. (A) P-III, Q-IV, R-I, S-II
Global public health history is defined by major concepts and milestones. Smallpox was eradicated in nineteen-eighty through intensive vaccination efforts. Sustainable Development Goal Three promotes comprehensive health and well-being for all. The double burden represents the coexistence of infectious and chronic diseases, while the epidemiological transition describes shifts in major causes of death and illness over time.

23. (B) Multidrug-resistant Tuberculosis (MDR-TB)
Non-communicable diseases are defined as chronic conditions that are non-infectious and cannot be transmitted between individuals, such as type two diabetes, cardiovascular diseases, and chronic obstructive pulmonary disease. Multidrug-resistant tuberculosis is caused by a biological pathogen, Mycobacterium tuberculosis, classifying it as a communicable infectious disease that remains a major threat to global public health systems.

24. (C) Rapid, unplanned urbanization and dietary shifts causing persistent undernutrition in some segments and obesity or diet-related NCDs in others.
The double burden of malnutrition arises from rapid, unplanned urbanization and significant nutrition transitions in developing economies. These societal shifts lead to situations where undernutrition, including stunting and wasting, coexists with rising rates of obesity and diet-related chronic conditions. This dual challenge

medical intervention, including cosmetic surgery, is free of charge.
Which of the following is correct?
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

139. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).
Assertion (A): The One Health approach is essential for predicting and preventing global pandemics.
Reason (R): Most emerging infectious diseases, such as COVID-19 and Ebola, are zoonotic, originating at the human-animal-environment interface.
Choose the correct option:
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

140. Which of the following statements correctly highlights the role of nutrition in achieving public health goals?
(A) Adequate nutrition is foundational to achieving SDG 3, as it boosts community immunity, supports maternal health, and prevents diet-related NCDs.
(B) Individual dietary nutrition is completely irrelevant and clinically unrelated to the prevention and management of non-communicable diseases.
(C) Nutrition interventions should only be applied during the late tertiary stage of a disease within specialized intensive care units.
(D) Consistently good nutrition strictly and permanently prevents any kind of inherited genetic mutations from occurring in human hosts.

141. How is the "One Health" concept best defined?
(A) A single, standardized global public health insurance policy designed to cover all basic human clinical healthcare costs across every sovereign nation.
(B) A narrow clinical medical philosophy proposing that there is only one true, scientifically proven pharmaceutical cure for every human infectious disease.
(C) A collaborative approach working across sectors to achieve optimal health by recognizing the connection between people, animals, and their environment.
(D) A traditional clinical research focus on human physical health while explicitly and systematically ignoring the environmental and veterinary sciences.

142. Match the global health initiatives/concepts in List I with their associated targets or descriptions in List II:
List I: Global health initiatives/concepts
P. SDG Goal 3
Q. Universal Health Coverage (UHC)
R. One Health
S. Zoonotic disease control
List II: Targets or descriptions
I. Integration of human, animal, and environmental health sectors
II. Financial risk protection and access to essential health services
III. Reducing maternal mortality and ending preventable newborn deaths
IV. Managing infections transmitted from animals to humans
(A) P-III, Q-II, R-I, S-IV
(B) P-II, Q-III, R-I, S-IV
(C) P-III, Q-I, R-II, S-IV
(D) P-I, Q-II, R-IV, S-III

143. Which of the following is NOT typically a specific target under SDG Goal 3?
(A) Substantially reducing the global maternal mortality ratio across nations
(B) Ending the epidemics of AIDS, tuberculosis, malaria and other diseases
(C) Eliminating all fiscal taxes on multinational healthcare corporations
(D) Achieving universal health coverage including financial risk protection

144. What is the cause-and-effect relationship driving the integration of Antimicrobial Resistance (AMR) into the One Health approach?
(A) The clinical misuse of antibiotic medications exclusively within human hospital medicine,

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33. (D) Statement I is incorrect but Statement II is correct.
The spiritual dimension of health is not synonymous with organized religious participation; instead, it encompasses a broader quest for personal meaning, purpose, and inner harmony. The environmental dimension recognizes that physical surroundings, including clean air, safe water, and stable housing, directly influence human health. Therefore, environmental quality remains a critical determinant of physical and psychological well-being.

34. (A) Both A and R are true and R is the correct explanation of A.
The definition of health established by the World Health Organization emphasizes that health is more than simply avoiding clinical disease. By incorporating physical, mental, and social well-being, this concept positions health as a positive, dynamic state. This multidimensional approach enables individuals and communities to realize aspirations, satisfy needs, and cope effectively with environmental and social challenges.

35. (A) It encompasses a state of balance between the individual and the surrounding world, including the capacity to cope with normal life stresses.
The mental dimension of health represents a state of psychological balance where an individual recognizes their abilities, copes with normal life stresses, and works productively. This dimension extends beyond the absence of diagnosed psychiatric disorders to encompass emotional resilience, cognitive clarity, and social integration. It is fundamental to decision-making, relationship-building, and overall quality of life.

36. (C) The ability to interact effectively with other people and the social environment, maintaining stable, satisfying interpersonal relationships.
Social health is defined as the capacity to interact effectively with others and adapt to diverse social situations. It involves establishing and maintaining stable, supportive interpersonal relationships, cultivating a sense of belonging, and actively participating in community life. This dimension emphasizes that positive social networks and community cohesion are vital components of overall human well-being.

37. (A) P-III, Q-IV, R-II, S-I
Understanding human well-being requires recognizing its distinct, interconnected dimensions. Physical health is marked by normal physiological functioning and organ capacity. Mental health involves emotional resilience and cognitive processing. Social health is demonstrated by harmony and integration in social relationships, while spiritual health is characterized by a deep sense of personal meaning and purpose in life.

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38. (D) Spiritual well-being
The original constitution of the World Health Organization, drafted in nineteen-forty-eight, defined health using three core dimensions: physical, mental, and social well-being. Although spiritual health has since been recognized as a vital dimension influencing quality of life and coping mechanisms, it was not explicitly included in the initial three-part definition of health formulated in nineteen-forty-eight.

39. (B) It leads directly to a severe decline in physical health outcomes due to increased incidence of respiratory illness and waterborne diseases.
Severe environmental degradation, such as air and water pollution, directly impacts physical health by exposing populations to hazardous substances. This exposure increases the incidence of chronic respiratory conditions, cardiovascular diseases, and infectious waterborne illnesses. Thus, degrading the physical environment undermines population-level health, demonstrating that ecological integrity is essential for maintaining physical wellness and community safety.

40. (A) 2-1-3-4
Improving community health dimensions requires a logical, stepwise approach that begins by addressing basic physical survival needs, such as clean water and adequate nutrition. Once these physical baselines are secured, interventions can focus on strengthening social support networks. Subsequently, promoting supportive mental environments and fostering spiritual fulfillment and self-actualization can be addressed.

41. (D) It is universally defined by the medical community as adherence to a specific religion.
The spiritual dimension of health is not restricted to formal religious adherence or dogmatic practices. Instead, it encompasses an individual's search for meaning, personal ethics, core values, and connection to a broader purpose. This dimension contributes significantly to psychological resilience, helping individuals cope

(C) Universal Health Coverage - Eliminating financial barriers to essential healthcare
(D) SDG Goal 3 - Promoting health and well-being globally across the lifespan

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occurs between initial exposure and clinical onset. Detecting diseases during this stage through screening is a key strategy for secondary prevention.

51. (A) A conceptual model showing that only a small fraction of a disease's prevalence is clinically observable, while the vast majority remains hidden in the population.
The iceberg phenomenon is an epidemiological model demonstrating that clinical cases represent only a small fraction of total disease prevalence. The vast majority of cases remain hidden in the population as sub-clinical, undiagnosed, or asymptomatic infections. This model underscores the importance of community-wide screening and active surveillance to identify the full burden of disease in a population.

52. (A) P-II, Q-IV, R-I, S-III
The natural history of disease progresses through distinct, identifiable stages. The stage of susceptibility involves exposure to risk factors without active pathology. The sub-clinical stage is marked by internal pathological changes without apparent symptoms. The clinical stage begins with the onset of symptoms, and the stage of resolution culminates in recovery, permanent disability, or death.

53. (A) Rabies
The iceberg phenomenon does not apply to rabies because virtually all infected individuals develop severe, unmistakable clinical symptoms. Rabies has a near-hundred-percent fatality rate once clinical signs appear, leaving no substantial pool of unrecognized, asymptomatic, or chronic carriers in the human population. This contrasts with conditions like hypertension or polio, which have large asymptomatic or sub-clinical phases.

54. (D) The infectious disease continues to transmit silently and undetected in communities, making coordinated public health outbreak control highly difficult.
A large sub-clinical population during an infectious disease outbreak allows the pathogen to transmit silently within communities. Without active screening, these undetected cases escape surveillance, continuing transmission chains and frustrating outbreak control efforts. This dynamic highlights the limitations of relying solely on clinical diagnoses, emphasizing the need for active case-finding and broad screening strategies.

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55. (B) Sub-clinical stage
In chronic conditions like atherosclerosis, routine cholesterol screening is most effective during the sub-clinical stage, when pathological changes are occurring without symptoms. Intervening during this phase allows for lifestyle modifications and medical therapies that can halt or reverse plaque buildup before clinical events, such as myocardial infarction, occur. This highlights the value of secondary prevention.

56. (C) It strictly implies full recovery and return to optimal health.
The resolution stage of a disease does not always result in a complete return to baseline health. While many individuals recover fully, this final phase can also culminate in chronic carrier states, long-term physical impairment, permanent disability, or death. Public health interventions during the clinical stage aim to guide resolution toward recovery and minimize permanent damage.

57. (D) Sub-clinical stage
To detect a disease before an individual recognizes they are ill, public health interventions must target the sub-clinical stage. During this phase, internal pathological changes are occurring, but visible symptoms have not yet manifested. Implementing screening tests during this stage allows for early diagnosis and prompt treatment, which is the core focus of secondary prevention.

58. (A) Natural history of disease
The progression of a disease process in an individual over time, in the absence of treatment, is defined as its natural history. This concept traces the disease from initial exposure to risk factors, through sub-clinical and clinical stages, to ultimate resolution. Understanding this pathway helps public health professionals identify optimal points for preventive and therapeutic interventions.

59. (B) Carrier
An individual who excretes a pathogen, such as Salmonella typhi, without showing clinical symptoms of disease is classified as a carrier. Carriers represent a key component of the hidden portion of the disease iceberg. Because they appear healthy, they can silently transmit infections within a community, posing a significant challenge for public health surveillance and control.

96. (B) Targeted, science-based measures aimed at preventing a specific disease or group of diseases by directly intercepting their known causes.
Specific protection is defined as targeted, evidence-based measures designed to prevent a specific disease or group of diseases. This mode of primary prevention intercepts the disease agent before it can infect or affect a susceptible host. Examples include childhood immunizations, the fortification of salt with iodine, and the use of personal protective equipment in industrial settings.

97. (A) P-I, Q-II, R-III, S-IV
Preventive interventions are structured across four distinct levels of prevention. Banning fast-food ads targeting children represents primordial prevention by preventing risk factors. Fortifying salt with iodine is primary prevention through specific protection. A Pap smear represents secondary prevention via early screening, while providing physical therapy after a stroke represents tertiary prevention through rehabilitation.

98. (A) Screening for breast cancer via mammography
Primary prevention aims to prevent the initial occurrence of a disease or injury through health promotion and specific protection. Screening for breast cancer using mammography is an example of secondary prevention, as it seeks to detect existing, asymptomatic disease early to prompt effective treatment. The other options represent primary prevention by preventing disease onset.

99. (A) Risk factors are entirely prevented from establishing in the population, leading directly to a profound, long-term decrease in the incidence of related NCDs.
Successfully implementing primordial prevention, such as culturally discouraging tobacco use, prevents key risk factors from establishing in a population. This upstream approach leads to a significant, long-term reduction in the incidence of related chronic diseases like lung cancer and cardiovascular conditions. By shaping social norms early, primordial prevention offers a sustainable way to improve population health.

100. (A) 3-2-4-1
Levels of prevention are applied chronologically along the natural history of a disease, from early to late phases. Primordial prevention is implemented first to prevent the emergence of risk factors. Primary prevention follows to intercept the disease before pathology begins. Secondary prevention focuses on early detection, and tertiary prevention is applied in late stages to limit disability.

101. (D) It is applied when risk factors are already highly prevalent in individuals.
Primordial prevention is designed to prevent the emergence of risk factors in a population, rather than managing them once they are established. Applying interventions when risk factors, such as obesity or hypertension, are already prevalent in individuals represents primary or secondary prevention. Primordial prevention focuses on upstream environmental, social, and policy changes to keep risk factors from developing.

102. (B) Providing standardized oral iron and folic acid dietary supplementation as a form of specific protection proactively.
Proactively providing iron and folic acid supplements to pregnant women is an effective primary prevention strategy using specific protection. This intervention prevents the onset of nutritional anemia, supporting maternal and fetal health. This proactive approach is more cost-effective and beneficial than waiting for clinical symptoms to appear or relying on invasive, late-stage blood transfusions.

103. (C) To prevent the initial biological occurrence or clinical onset of a disease within a healthy, susceptible population.
The primary objective of primary prevention is to prevent the initial occurrence or clinical onset of a disease or injury within a healthy population. This is achieved by reducing exposure to hazards, promoting healthy lifestyles, and implementing specific protective measures like vaccines. This approach aims to keep the population healthy, reducing the need for downstream clinical treatments.

104. (D) Primordial prevention
Legislating a permanent ban on industrial trans-fats in food production is a classic example of primordial prevention. This policy-level intervention prevents cardiovascular risk factors from entering the population's diet, addressing the environmental conditions that contribute to chronic disease. By targeting the food supply upstream, this legislation helps protect the entire community from developing metabolic risks.

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69. (A) Increased population incidence rates of acute respiratory infections and common airborne communicable diseases.
Living in overcrowded and damp housing exposes residents to mold, cold, and poor ventilation. This environmental determinant increases the risk and transmission of acute respiratory infections and other airborne communicable diseases. Addressing these housing conditions through urban planning and safety regulations is essential for improving physical health outcomes and reducing health disparities in vulnerable communities.

70. (A) 1-2-3-4
Ecological models of health structure determinants along a spectrum from upstream to downstream factors. Upstream interventions target macro-level socioeconomic and environmental conditions, followed by living and working environments. Moving downstream, factors narrow to individual lifestyle choices and behaviors, and finally to non-modifiable biological characteristics like age, sex, and genetic makeup at the individual level.

71. (B) They are entirely independent of an individual's socioeconomic status.
Behavioral determinants, such as diet, physical activity, and tobacco use, are not independent of socioeconomic status. An individual's choices are shaped by income, education, and geographic access to healthy resources. For example, lower-income neighborhoods may lack affordable fresh produce, influencing dietary habits. Public health policies must address these socioeconomic factors to support healthy behaviors.

72. (C) Socioeconomic and food environment factors
High rates of malnutrition in a community lacking fresh produce reflect a failure of socioeconomic and food environment determinants. When residents must rely on cheap, highly processed foods, their dietary choices are constrained by structural availability and cost. Addressing this issue requires interventions that improve food retail infrastructure and access, rather than focusing solely on individual education.

73. (D) Socioeconomic factors (e.g., income, education)
Socioeconomic factors, such as income, employment, and education, have a profound impact on a population's overall health status. These "social determinants" shape living conditions, nutritional access, and health-related behaviors. While clinical care is vital, improving socioeconomic conditions is key to reducing health inequities and achieving sustainable, population-wide improvements in life expectancy and well-being.

74. (A) Behavioural determinant
Developing type two diabetes primarily due to physical inactivity and a diet high in refined carbohydrates highlights the influence of behavioral determinants. These lifestyle habits are key drivers of metabolic diseases. Public health interventions target these behaviors through educational campaigns, promoting active transport, and implementing policies that make healthy food options more accessible and affordable.

75. (B) Socioeconomic - Employment status
Employment status is a classic socioeconomic determinant of health, as it provides income, stability, and social connection. This pairing is correct, whereas the others misclassify determinants. For example, air pollution is environmental, alcohol consumption is behavioral, and education is socioeconomic. Correctly categorizing these factors helps public health professionals design interventions that target the appropriate level of influence.

76. (A) 1, 2 and 3
The social determinants of health represent the conditions in which people are born, grow, live, work, and age. These factors, including nutritional access, are major drivers of health inequities globally. They also influence infectious disease dynamics, as overcrowding and poor sanitation can increase transmission, demonstrating that social conditions shape both chronic and infectious disease risks.

77. (A) The absence of socially unjust, unfair, and avoidable or remediable differences in health among different community and social groups.
Health equity is defined as the absence of socially unjust, unfair, and avoidable differences in health status across different populations. Achieving equity involves addressing systemic barriers and distributing resources according to need, ensuring everyone has a fair opportunity to reach their full health potential. This concept is distinct from equality, which involves providing identical resources regardless of need.

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78. (C) Statement I is correct but Statement II is incorrect.
Food security exists when all individuals have consistent physical and economic access to sufficient, safe, and nutritious food. This is a critical socioeconomic determinant of health rather than a purely agricultural issue, as it directly impacts nutritional status and chronic disease risk. Addressing food security requires cross-sectoral policies that manage food pricing, distribution, and social safety nets.

79. (A) Both A and R are true and R is the correct explanation of A.
Maternal education is a strong social determinant linked to improved child health outcomes. Educated mothers are generally more empowered to access health information, implement hygienic practices, and seek timely medical care for their children. This empowerment improves nutrition and immunization rates, demonstrating how investing in women's education can yield significant, multi-generational public health benefits.

80. (C) Safe and secure employment provides critical financial stability, social support networks, and positive self-esteem, enhancing overall health.
Employment serves as a vital determinant of health by providing financial stability, social networks, and a sense of purpose. Safe working conditions protect individuals from physical hazards, while stable employment mitigates chronic stress associated with financial insecurity. Consequently, secure and fair employment opportunities are foundational to promoting mental and physical well-being across populations.

81. (B) Inequality refers to any descriptive difference in health status, while inequity refers to differences that are socially unjust and unfair.
The distinction between health inequality and health inequity is fundamental to public health policy. Inequality describes any measurable difference in health status between groups, which may stem from non-modifiable biological factors. Inequity refers specifically to differences that are systematic, avoidable, and socially unjust. Public health programs target inequities to eliminate unfair barriers to optimal health.

82. (A) P-II, Q-III, R-IV, S-I
Food security relies on four essential, interacting pillars. Food availability requires a consistent and sufficient supply of food. Access refers to having adequate resources to acquire appropriate foods. Utilization involves the biological capacity of the body to process nutrients, and stability ensures that availability, access, and utilization remain constant and secure over time.

83. (A) Food homogenization
Food security is supported by four core pillars: availability, accessibility, utilization, and stability. These pillars ensure that populations have reliable access to nutritious food and can process it effectively. Food homogenization, which refers to making food products uniform, is not a recognized pillar of food security and does not address the socioeconomic challenges of nutrition and food access.

84. (C) It leads directly to a steep social gradient in health, where lower-income groups consistently suffer higher morbidity and lower life expectancy.
High levels of income inequality correlate with a steep social gradient in health, where lower-income groups experience worse health outcomes and shorter lifespans. This gradient reflects unequal access to nutritious food, safe housing, quality education, and healthcare. Addressing income inequality through progressive policies is a key strategy for reducing these health disparities and improving population-level wellness.

85. (D) Subsidizing fresh fruits and vegetables specifically within low-income neighborhoods and systematically improving local grocery infrastructure.
Promoting health equity in marginalized urban food deserts requires structural interventions that address financial and physical barriers to nutrition. Subsidizing fresh produce in low-income areas and improving grocery infrastructure directly enhances access to healthy foods. This targeted approach helps reduce diet-related health disparities, offering a more sustainable solution than relying solely on individual education.

86. (B) It is only observed in low-income, developing nations.
The social gradient in health is a global phenomenon observed in low, middle, and high-income nations alike. It demonstrates that health outcomes improve incrementally at each step up the socioeconomic ladder. Even in wealthy countries with universal healthcare, differences in income, education, and occupational status

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continue to influence life expectancy and chronic disease rates.

87. (C) Environmental determinants of food supply and physical access
A community situated in a food desert lacks physical and financial access to nutritious foods. To address this issue, public health efforts must focus on environmental determinants of food supply and retail infrastructure. Working with urban planners and local businesses to bring healthy food options into these areas is key to reducing nutritional deficiencies and related chronic diseases.

88. (D) Reliable access to nutritious food prevents both undernutrition and diet-related chronic diseases, heavily influencing overall population health.
Food security acts as a vital socioeconomic determinant of health by ensuring consistent access to safe, nutritious foods. This access supports physical development and immune function, while reducing the risk of both undernutrition and diet-related chronic conditions like obesity and cardiovascular disease. Consequently, food security policies are essential for promoting long-term population health and well-being.

89. (A) Health inequity driven by social determinants
A ten-year gap in life expectancy between low- and high-income neighborhoods in the same city is a classic example of health inequity. These differences are systematic, avoidable, and socially unjust, driven by unequal distribution of resources, environmental quality, and access to services. Addressing these social determinants is a primary goal of health equity initiatives.

90. (B) Health inequity - Genetically unavoidable differences in lifespan
Health inequity refers to differences in health outcomes that are avoidable, unnecessary, and socially unjust, rather than genetically predetermined. In contrast, health inequalities may stem from non-modifiable biological factors. Correctly defining health inequity allows public health policies to target systemic social and environmental barriers, with the goal of ensuring fair opportunities for optimal health.

91. (B) 1, 2 and 4
Primordial prevention focuses on preventing the emergence of risk factors within a population, targeting broad social, economic, and cultural conditions. Policies that promote healthy diets in children are a classic example, as they establish lifelong healthy habits. This level of prevention differs from secondary prevention, which focuses on early diagnosis and prompt clinical treatment.

92. (A) Health promotion and specific protection
Primary prevention is achieved through two main modes of intervention: health promotion and specific protection. Health promotion involves broad, non-specific measures like nutrition education and encouraging physical activity to enhance overall well-being. Specific protection includes targeted interventions, such as immunizations or wearing safety gear, designed to prevent the occurrence of specific diseases or injuries.

93. (D) Statement I is incorrect but Statement II is correct.
Administering a vaccine to prevent polio is an example of specific protection, which is a targeted mode of primary prevention, rather than broad health promotion. Specific protection interventions are designed to prevent the occurrence of a specific disease, whereas health promotion focuses on improving overall health and well-being through non-specific lifestyle and environmental enhancements.

94. (A) Both A and R are true and R is the correct explanation of A.
Primordial prevention is a key strategy for addressing the rising burden of chronic non-communicable diseases. By targeting the broad socioeconomic and environmental conditions that foster unhealthy habits, this approach prevents risk factors like physical inactivity and poor diet from establishing in a population. This early focus helps reduce the long-term incidence of chronic conditions.

95. (C) It is a form of primary prevention (specific protection).
Routine childhood immunization is a classic example of specific protection under primary prevention. It involves administering a vaccine to stimulate an immune response against a specific pathogen, preventing the disease from occurring in a susceptible host. This targeted approach is one of the most effective and cost-efficient public health interventions for controlling infectious diseases globally.

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60. (B) Waterline - The division between recognized and unrecognized clinical disease
In the iceberg phenomenon, the waterline represents the threshold of clinical detection, separating apparent cases from inapparent, sub-clinical, or asymptomatic ones. Defining it as the division between recognized and unrecognized clinical disease is incorrect, because sub-clinical cases below the line are not yet clinical. The waterline divides symptomatic, diagnosed illness from the vast, hidden pool of asymptomatic cases.

61. (B) 1, 2 and 4
Health determinants encompass biological factors like genetics, behavioral choices like diet, and broad socioeconomic conditions. Environmental determinants include physical factors such as air quality and sanitation, but are not limited to indoor environments. Understanding these diverse, interacting categories allows public health officials to design comprehensive interventions that address the root causes of disease across communities.

62. (C) Tobacco consumption
Tobacco consumption is a classic behavioral determinant of health, representing an individual lifestyle choice that directly increases the risk of chronic conditions. Unlike genetic factors, behavioral determinants are modifiable through education, support programs, and public policies, such as taxation and marketing restrictions. Addressing these habits is a major focus of primary and primordial prevention strategies.

63. (C) Statement I is correct but Statement II is incorrect.
Socioeconomic determinants of health include critical structural factors such as educational attainment, employment status, and household income levels. In contrast, biological determinants, such as age, biological sex, and genetic makeup, are non-modifiable and cannot be directly altered through public health policies. Public health instead focuses on modifying environmental and behavioral factors to mitigate biological risks.

64. (A) Both A and R are true and R is the correct explanation of A.
Income level is a powerful socioeconomic determinant of health that shapes living standards and access to resources. Higher income enables individuals to secure nutritious food, safe housing, and quality healthcare services, while reducing exposure to environmental hazards. This financial security directly influences physical and mental well-being, demonstrating a strong link between economic status and health outcomes.

65. (B) They are inherent biological, hereditary factors that can predispose individuals to certain chronic diseases like sickle cell anemia.
Genetic determinants are inherent, hereditary factors passed down through generations that influence an individual's susceptibility to specific diseases. Conditions like sickle cell anemia or cystic fibrosis are directly determined by genetic inheritance. While these biological factors are non-modifiable, understanding genetic predispositions helps public health programs design targeted screening, counseling, and early clinical management strategies.

66. (D) Any factor, whether personal, social, economic, or environmental, that directly or indirectly influences the health status of populations.
A determinant of health is defined as any factor that influences the health status of individuals or populations. These factors span multiple categories, including biological genetics, individual behavioral choices, social environments, and physical surroundings. Public health programs analyze these determinants to understand disease patterns and develop interventions that target the underlying causes of poor health outcomes.

67. (A) P-III, Q-IV, R-II, S-I
Health outcomes are shaped by different categories of determinants. Biological determinants include inherited genetic mutations, while behavioral determinants involve individual choices like a high-sugar diet. Socioeconomic determinants are represented by societal factors such as high levels of education, and environmental determinants encompass physical conditions like poor ambient air quality in a community.

68. (C) Occupational hazard exposure
Biological determinants of health are inherent physiological characteristics, such as chronological age, biological sex, and genetic makeup. Occupational hazard exposure, however, is an environmental and socioeconomic determinant related to working conditions. While biological factors are non-modifiable, workplace hazards are modifiable through safety regulations, engineering controls, and protective policies, making them a key target for occupational health.

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105. (A) National policy taxing sugary drinks - Primordial prevention
Implementing a national tax on sugar-sweetened beverages is an example of primordial prevention, as it aims to prevent the emergence of risk factors like obesity and dental caries at a population level. This structural policy intervention modifies the socioeconomic environment, making healthier choices more accessible, which is distinct from secondary and tertiary clinical care.

106. (B) 1, 2 and 4
The Wilson-Jungner criteria guide the implementation of screening programs, requiring that the condition be an important health problem with a recognizable latent stage. Additionally, there must be an accepted, effective treatment available. Crucially, treating the disease during the asymptomatic stage should offer a clear advantage over waiting until clinical symptoms present, supporting early intervention.

107. (B) To halt the progress of a disease at its earliest incipient stage through rapid, early diagnosis and prompt clinical treatment.
The primary objective of secondary prevention is to halt the progression of a disease at an early stage, preventing complications and improving prognosis. This is achieved through early detection, screening programs, and prompt clinical treatment. By identifying and treating conditions before symptoms become severe, secondary prevention reduces morbidity and mortality across the population.

108. (C) Statement I is correct but Statement II is incorrect.
Tertiary prevention includes both disability limitation and rehabilitation, applied during the advanced clinical stage of a disease rather than the pre-pathogenesis phase. These late-stage interventions aim to reduce the impact of permanent impairments, restore function, and improve quality of life, distinguishing them from primary prevention strategies that occur before pathology begins.

109. (C) A is true but R is false.
Early diagnosis and prompt treatment are key components of secondary prevention, aimed at detecting and curing disease in its early stages. However, the reason is incorrect because these actions do not prevent disease onset or intercept the agent before infection. Instead, secondary prevention is applied after pathological changes have begun, working to limit the disease's impact.

110. (D) It involves clinical interventions aimed at halting a disease process that has crossed early detection, preventing transition into severe impairment.
Disability limitation is a component of tertiary prevention that involves clinical interventions designed to halt a disease process from progressing to severe impairment or permanent disability. These measures are applied when early detection was missed or ineffective, working to protect remaining bodily function, prevent complications, and support the patient's long-term physical recovery.

111. (C) The presumptive identification of unrecognized disease or defect by the rapid application of tests to a seemingly healthy, asymptomatic population.
Screening is defined as the presumptive identification of unrecognized disease in an asymptomatic, seemingly healthy population. Using rapid and simple tests, screening distinguishes apparently healthy individuals who likely have the disease from those who do not. This is a key strategy for secondary prevention, enabling early diagnosis and treatment before clinical symptoms present.

112. (A) P-II, Q-I, R-IV, S-III
Rehabilitation is structured across different areas to support comprehensive recovery. Medical rehabilitation focuses on restoring physical function through therapy or prosthetics. Vocational rehabilitation aims to restore earning capacity and job skills, while social rehabilitation reintegrates individuals into family and community life. Psychological rehabilitation helps patients build resilience and cope emotionally after a major illness.

113. (D) The disease must be extremely rare with no known treatment.
According to the Wilson-Jungner criteria, a screening program is not appropriate for rare diseases that lack effective treatment options. Screening requires that the condition be an important public health problem with an accepted treatment. Implementing mass screening when no treatment exists would fail to benefit the individual, violating a fundamental ethical principle of public health.

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114. (A) An increase in detected prevalence during the early phase, followed eventually by a significant reduction in disease-specific mortality.
An effective secondary prevention screening program initially increases the detected prevalence of a disease as previously undiagnosed cases are identified. Over time, early detection and prompt treatment lead to improved clinical outcomes and a significant reduction in disease-specific mortality. This shift demonstrates the program's success in altering the natural history of the condition.

115. (C) No, because there is currently no accepted, effective treatment available for patients with recognized disease, directly violating a core criterion.
Screening is not recommended for conditions that lack an accepted, effective treatment, as early detection would not offer a clear advantage to the patient. Mass screening under these circumstances can cause psychological harm without providing a path to recovery. This directly violates the Wilson-Jungner criteria, which require that screening lead to actionable, beneficial treatment.

116. (A) It is primarily aimed at reversing the disease process back to the stage of complete susceptibility.
Tertiary prevention is applied in the late stages of disease and does not aim to reverse the pathology back to a state of susceptibility. Instead, it focuses on limiting disability, managing chronic conditions, and providing rehabilitation. These interventions help patients adapt to permanent impairments, reduce suffering, and maximize their remaining functional capacity and quality of life.

117. (D) The condition has a clearly recognizable sub-clinical early stage, and early intervention like protective equipment actively alters the prognosis.
A valid screening program for occupational hearing loss requires that the condition have a recognizable sub-clinical stage, where early intervention can alter the prognosis. Identifying early changes allows employers to implement protective measures, preventing permanent damage. This alignment with screening principles ensures the program offers a clear benefit to the employees being tested.

118. (B) Screening should only be undertaken if it leads to a clear, proven benefit for the individuals being screened through effective and early treatment.
The foundational principle of the Wilson-Jungner criteria is that screening should offer a clear, proven benefit to the individuals being tested. This benefit is realized when early detection leads to timely, effective treatment that improves health outcomes. Screening is not merely an information-gathering exercise; it must be coupled with a system for diagnostic follow-up and care.

119. (C) Tertiary prevention (Rehabilitation)
Providing speech therapy, physical therapy, and assistive devices to a patient recovering from a stroke is an example of tertiary prevention through rehabilitation. These interventions focus on restoring function, improving quality of life, and helping the individual adapt to permanent impairments. This support helps reduce long-term dependency and facilitates reintegration into family and community life.

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120. (D) Tertiary prevention - Mandatory fortification of flour with iron to prevent anemia
Fortifying flour with iron is a form of primary prevention (specific protection) because it is a population-level intervention designed to prevent the onset of nutritional anemia in healthy individuals. Classifying this activity as tertiary prevention is incorrect, as tertiary interventions are applied in the late stages of disease to limit disability and support rehabilitation.

121. (B) 1, 2 and 4
Adopted in nineteen-eighty-six, the Ottawa Charter for Health Promotion established a modern framework that moves beyond clinical treatment settings. It outlines key action areas, including building healthy public policy, creating supportive environments, and strengthening community action. This approach empowers individuals and communities to increase control over their health, promoting wellness across society.

122. (B) 1986
The landmark Ottawa Charter for Health Promotion was adopted in nineteen-eighty-six during the first International Conference on Health Promotion. This document established a comprehensive framework that redefined health promotion, emphasizing social, environmental, and political action to enable individuals and

communities to increase control over and improve their overall health.

123. (C) Statement I is correct but Statement II is incorrect.
In the classic epidemiological triad, the host is defined as the human or animal that harbors the disease. The agent, however, is not restricted to biological microorganisms like bacteria or viruses; it also encompasses chemical toxins, physical factors like radiation, and nutritional deficiencies, all of which can initiate a pathological process.

124. (A) Both A and R are true and R is the correct explanation of A.
Modifying the environment is a highly effective strategy for breaking the chain of disease transmission within the epidemiological triad. The environment provides the physical, biological, and socioeconomic conditions that allow pathogens to survive, replicate, and reach susceptible hosts. Altering these external factors, such as improving sanitation, directly reduces exposure and controls disease spread.

125. (C) The comprehensive process of enabling communities and individuals to increase control over, and to significantly improve, their own health.
The Ottawa Charter defines health promotion as a comprehensive process that enables individuals and communities to increase control over, and improve, their health. This approach moves beyond clinical medical treatments to address broad social, environmental, and economic determinants of well-being, fostering personal skills and community action to support healthier lifestyles.

126. (D) A traditional model of disease causation depicting the ongoing interaction between the active agent, the host, and the environment.
The epidemiological triad is a traditional model of disease causation that illustrates the ongoing interaction between three key components: the agent, the host, and the environment. This framework is used to understand how infectious and non-infectious conditions develop, helping public health professionals identify points of intervention to break transmission chains and prevent illness.

127. (A) P-III, Q-IV, R-II, S-I
The components of the epidemiological triad interact to influence disease dynamics. Biological agents include pathogens like the influenza virus, while nutritional agents involve deficiencies such as severe lack of Vitamin C. Host factors encompass individual traits like age and genetic susceptibility, and environmental factors represent external conditions like extreme temperature and humidity.

128. (B) Expanding private insurance monopolies
The Ottawa Charter for Health Promotion outlines five key action areas: building healthy public policy, creating supportive environments, strengthening community action, developing personal skills, and reorienting health services. Expanding private insurance monopolies is not an action area of this charter, as the framework focuses on equitable, community-based health promotion rather than commercial clinical services.

129. (D) It eliminates the environmental breeding ground for the vector, thereby preventing the biological agent from successfully reaching the host.
Draining stagnant water bodies modifies the physical environment, eliminating the essential breeding grounds for mosquito vectors that transmit malaria. By reducing vector populations, this intervention prevents the malaria parasite from reaching susceptible human hosts. This environmental management strategy effectively breaks the transmission chain without requiring clinical medical treatments for the population.

130. (A) 1-2-3-4
Promoting health effectively requires a logical progression from macro-level policies to individual empowerment, following the Ottawa Charter framework. This sequence begins with building healthy public policies, followed by creating supportive physical and social environments. Next, community action is strengthened to support local initiatives, culminating in developing personal skills to empower individuals to make healthy choices.

131. (C) They include the physical climate and geography of the region.
Host factors in the epidemiological triad are intrinsic characteristics of the individual, such as age, sex, genetic traits, immune status,

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and behaviors like diet. The physical climate and geography of a region are classified as environmental factors, which represent the external conditions influencing the survival of the agent and its exposure to the host.

132. (A) Mandating and subsidizing the installation of cold storage units and clean water stations in all local commercial food retail markets.
Creating supportive environments under the Ottawa Charter involves modifying physical settings to make healthy choices easier and safer. Installing cold storage and clean water stations in food markets directly improves the safety of the local food environment, reducing pathogen transmission. This structural intervention is far more effective than relying solely on individual clinical care.

133. (D) Health is actively created and lived by people within the settings of their everyday life, specifically where they learn, work, play, and love.
The core philosophy of health promotion positions health as a dynamic resource created and experienced in everyday settings. This perspective emphasizes that well-being is shaped by where people learn, work, play, and live, rather than being solely a clinical medical responsibility. Health promotion works to improve these daily environments to support overall population wellness.

134. (B) The flooded physical conditions and poor sanitation in the camp
In the cholera outbreak scenario, the flooded physical conditions and poor sanitation in the refugee camp represent the environmental component of the epidemiological triad. This environment provides the conditions that allow the biological agent, Vibrio cholerae, to survive, spread, and infect susceptible hosts, illustrating how ecological factors drive infectious disease outbreaks.

135. (C) Reorienting health services - Shifting institutional focus from clinical cure to broad community-wide disease prevention programs.
Reorienting health services under the Ottawa Charter involves shifting the focus of healthcare systems from purely reactive clinical treatments toward proactive, community-wide disease prevention and health promotion. This transition helps health systems address the root causes of disease, improving population health outcomes and supporting the sustainability of public health services.

136. (B) 1, 2 and 4
The One Health approach recognizes the close connection between human health, animal health, and our shared environment. This collaborative framework is essential for managing zoonotic diseases and addressing critical global health challenges like antimicrobial resistance. By promoting inter-sectoral cooperation over isolated efforts, One Health supports more effective disease monitoring and pandemic prevention strategies.

137. (A) Ensure healthy lives and promote physical and mental well-being for all individuals at all ages.
Sustainable Development Goal Three is dedicated to ensuring healthy lives and promoting well-being for all individuals at all ages. This goal addresses key targets, including reducing maternal and child mortality, ending epidemics of infectious diseases, and preventing non-communicable illnesses, while supporting universal health coverage and access to quality, affordable healthcare services globally.

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138. (C) Statement I is correct but Statement II is incorrect.
Universal Health Coverage ensures that all individuals have access to essential, high-quality health services without experiencing financial hardship. However, this framework does not guarantee that every medical procedure, including elective cosmetic surgery, is free of charge. UHC prioritizes essential health services, including promotion, prevention, treatment, and rehabilitation, to protect public well-being.

139. (A) Both A and R are true and R is the correct explanation of A.
The One Health approach is crucial for predicting and preventing global pandemics, as most emerging infectious diseases originate at the human-animal-environment interface. Pathogens like those causing Ebola and COVID-19 are zoonotic, demonstrating that human health is linked to animal and environmental health. Coordinating surveillance across these sectors is key to early pathogen detection.

140. (A) Adequate nutrition is foundational to achieving SDG 3, as it boosts community

immunity, supports maternal health, and prevents diet-related NCDs.
Adequate nutrition is a foundation of public health and is essential for achieving Sustainable Development Goal Three. Good nutrition supports immune function, promotes healthy maternal and child development, and reduces the risk of chronic conditions like cardiovascular disease and diabetes. Therefore, nutrition interventions are vital components of primary prevention and population-level health strategies.

141. (C) A collaborative approach working across sectors to achieve optimal health by recognizing the connection between people, animals, and their environment.
One Health is defined as a collaborative, multi-sectoral approach that recognizes the connection between human health, animal health, and our shared environment. By working across disciplines, this framework addresses complex global health issues, including zoonotic disease outbreaks, food safety, and antimicrobial resistance, to protect the well-being of all living species and ecosystems.

142. (A) P-III, Q-II, R-I, S-IV
Global health concepts address different facets of population well-being. Sustainable Development Goal Three targets maternal and child health, while Universal Health Coverage focuses on financial protection and service access. One Health integrates human, animal, and environmental sectors, and zoonotic disease control manages infectious pathogens that transmit between animal and human hosts.

143. (C) Eliminating all fiscal taxes on multinational healthcare corporations
Sustainable Development Goal Three includes critical targets, such as reducing maternal mortality, ending epidemics of infectious diseases, and achieving universal health coverage with financial risk protection. Eliminating fiscal taxes on multinational healthcare corporations is not a target of this goal, as Goal Three focuses on promoting health equity and expanding access to essential services.

144. (B) The extensive use of antimicrobials in human medicine and livestock agriculture, driving the development and spread of resistant pathogens across environments.
Integrating antimicrobial resistance into the One Health approach is driven by the extensive use of antimicrobials in human medicine and livestock farming. This widespread use drives the development and environmental spread of resistant pathogens, affecting humans, animals, and ecosystems. Addressing this challenge requires coordinated stewardship and regulation across clinical, veterinary, and environmental sectors.

145. (D) Collaborating across veterinary, environmental, and human health sectors to improve farm hygiene, test water runoff, and monitor active clinical cases.
Managing a zoonotic foodborne pathogen like Salmonella in poultry requires a comprehensive One Health approach. Collaborating across veterinary, environmental, and human health sectors allows for integrated interventions, such as improving farm hygiene, testing agricultural water runoff, and monitoring human cases. This coordinated effort addresses the pathogen at its source, protecting public health effectively.

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146. (A) It requires out-of-pocket payments to be the primary funding mechanism for healthcare.
Universal Health Coverage is designed to protect individuals from financial hardship, making reliance on out-of-pocket payments as the primary funding source incorrect. UHC aims to ensure that everyone has access to high-quality essential health services without facing poverty, requiring prepaid, pooled funding mechanisms such as taxation or social health insurance to support equitable access.

147. (C) Initiating a coordinated inter-sectoral response involving environmental protection, fisheries, and human health authorities to remediate the source.
In the pesticide contamination scenario, a One Health response involves coordinating actions across environmental, fisheries, and human health authorities to address the source of pollution. By remediating the contaminated river and protecting the local ecosystem, this integrated approach prevents further human exposure and environmental damage, demonstrating how cross-sectoral collaboration resolves complex health hazards.

148. (A) Nutrition acts as primordial and primary prevention, drastically reducing the downstream disease burden and making health systems financially sustainable.
Improving global nutrition is linked to Universal Health Coverage and SDG Three because nutrition

(C) It eliminates the need for trained interviewers as it is completely self-administered.
(D) It is highly suitable for large-scale population studies due to its rapid administration.

7. An investigator is planning to assess the average protein intake of a large rural population within a limited timeframe and budget. Which dietary assessment method is most appropriate to apply in this scenario?
(A) 7-day weighed food record
(B) Repeated 24-hour dietary recall
(C) Duplicate diet approach
(D) Direct clinical observation of all meals

8. In the context of nutritional surveys, analyze the assertion and reason given below:
Assertion (A): The 24-hour dietary recall method is widely used in national-level nutrition surveys.
Reason (R): The 24-hour recall method provides precise measurements of trace minerals stored in the body.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

9. All of the following tools or aids are commonly used by investigators during a 24-hour dietary recall to help respondents estimate portion sizes, EXCEPT:
(A) Standardized bowls and spoons
(B) Two-dimensional food models or photographs
(C) Standard raw-to-cooked weight conversion tables
(D) Biochemical reagent kits

10. Identify the INCORRECT pair of dietary assessment method and its typical timeframe.
(A) Weighed food record - Exact duration of digestion in the stomach
(B) 24-hour recall - Previous 24 hours
(C) Food Frequency Questionnaire - Typical intake over past month or year
(D) Dietary history - Usual intake over weeks to months

11. Arrange the chronological steps involved in conducting a standardized 24-hour dietary recall.
1. Probing for forgotten foods and beverages
2. Estimating portion sizes of the consumed items
3. Quick list of foods consumed in the past 24 hours
4. Final review and verification of the recorded data

(A) 3, 1, 2, 4
(B) 1, 3, 2, 4
(C) 3, 2, 1, 4
(D) 1, 2, 3, 4

12. What is the most likely effect of "social desirability bias" during a dietary survey?
(A) It leads to falsely enhanced precision when measuring exact daily calorie intakes.
(B) It causes underreporting of unhealthy foods and overreporting of healthy choices.
(C) It causes the primary investigator to miscalculate standard food conversion factors.
(D) It results in the spontaneous biological improvement of key biochemical markers.

13. Identify the CORRECT pair regarding biases in dietary surveys.
(A) Recall bias - Inability to accurately remember foods eaten
(B) Observer bias - Respondent altering diet because they are being watched
(C) Reactivity - Interviewer leading the respondent to specific answers
(D) Selection bias - Errors in standardizing the measuring cups

14. Identify the INCORRECT statement regarding the dietary history method.
(A) It aims to capture the habitual food intake of an individual.
(B) It generally requires a long interview time, making it less suitable for large surveys.
(C) It is highly objective and does not depend on the skill of the interviewer.
(D) It is often combined with a 24-hour recall or a food frequency cross-check.

15. What is the most appropriate reason for using a multiple-pass approach in a 24-hour dietary recall?
(A) To artificially increase the overall operational and administrative cost of the survey
(B) To comprehensively train the participating respondents on standard domestic cooking methods
(C) To directly measure and record the baseline

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CHAPTER 35

Dietary and Clinical Surveys and Nutrition Programmes

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1. What is the primary purpose of conducting a dietary survey in a specific community?
(A) To evaluate the microbiological safety of agricultural and industrial food supply chains
(B) To assess qualitative and quantitative dietary intake to determine nutritional status
(C) To identify genetic predispositions and susceptibility to complex metabolic diseases
(D) To enforce legal and penal actions against food adulterators under prevailing FSSAI norms

2. Match the dietary survey methods in List I with their defining characteristics in List II.
List I: (Dietary survey methods)
P. 24-hour recall
Q. Weighed food record
R. Food Frequency Questionnaire
S. Dietary history
List II: (Defining characteristics)
I. Long-term qualitative intake pattern of specific food items
II. Relies on the individual's memory of the previous day
III. Comprehensive assessment of usual diet over a prolonged period
IV. Direct measurement of ingredients before cooking and eating
(A) P-II, Q-IV, R-I, S-III
(B) P-I, Q-III, R-II, S-IV
(C) P-IV, Q-II, R-III, S-I
(D) P-II, Q-III, R-IV, S-I

3. Consider the following statements regarding the 24-hour dietary recall method:
Statement I: It requires highly educated respondents to accurately log their intake.
Statement II: Standardized measuring cups and spoons are used by the investigator to estimate portion sizes.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

4. Which of the following best defines a "Dietary Survey"?
(A) A comprehensive clinical analysis of biochemical markers in blood to diagnose deficiencies
(B) A routine safety inspection of food processing facilities to ensure regulatory compliance
(C) A systematic assessment of food and fluid intake in a population over a specific timeframe
(D) A physical examination of clinical symptoms to confirm cases of severe acute malnutrition

5. Consider the following statements regarding the limitations of the 24-hour dietary recall method:
I. It heavily relies on the respondent's memory.
II. It is highly expensive and requires specialized laboratory equipment.
III. It may not represent an individual's habitual daily diet.
IV. It is prone to the "flat-slope syndrome" where intake is overreported by low consumers and underreported by high consumers.
Which of the above statement(s) is/are correct?
(A) I, II, and III only
(B) I, III, and IV only
(C) II, III, and IV only
(D) I, II, III, and IV

6. Identify the correct statement regarding the application of the 24-hour dietary recall method.
(A) It is exclusively used for assessing long-term habitual intakes over several years.
(B) It is considered the gold standard for measuring exact individual nutrient absorption.

39. All of the following anthropometric parameters are routinely measured in children under 5 during the NFHS to assess malnutrition, EXCEPT:
(A) Total body weight measured on standard digital scales
(B) Body fat percentage via bioelectrical impedance
(C) Height or recumbent length using a stadiometer
(D) Hemoglobin levels to assess anemia prevalence

40. Identify the INCORRECT pair regarding NFHS nutritional indicators and their standard definitions.
(A) Wasting - Weight-for-height Z-score below -2 SD
(B) Severe Wasting - Weight-for-height Z-score below -3 SD
(C) Underweight - BMI-for-age Z-score below -4 SD
(D) Stunting - Height-for-age Z-score below -2 SD

41. Arrange the following major national surveys in the chronological order of their latest major release or conclusion.
1. NFHS-4
2. CNNS
3. NFHS-5
4. NNMB Final Rural Report
(A) 4, 1, 2, 3
(B) 1, 4, 2, 3
(C) 4, 2, 1, 3
(D) 1, 2, 4, 3

42. What is a direct cause-and-effect relationship highlighted by consistent NFHS data showing high anaemia rates in pregnant women?
(A) Fetal development complications and higher rates of maternal mortality
(B) Drastic decrease in the overall clinical prevalence of gestational diabetes
(C) Significantly higher absorption rates of calcium in the fetal skeletal system
(D) Increased biological synthesis and overall production of thyroid hormones

43. Identify the CORRECT pair of survey and its specific target group or outcome focus.
(A) NNMB - Urban upper-class dietary habits exclusively
(B) CNNS - School-age children, adolescents, and pre-schoolers
(C) NFHS - Geriatric population health profiles solely
(D) Sample Registration System - Detailed daily dietary intake of rural households

44. Identify the INCORRECT statement regarding the National Nutrition Monitoring Bureau (NNMB).
(A) It was originally established in 1972 under the Indian Council of Medical Research.
(B) It is still the primary active agency releasing annual dietary data as of 2024.
(C) It generated continuous data on diet and nutritional status in 10 major states of India.
(D) Its data was instrumental in forwarding national supplementary feeding programs.

45. What makes the Comprehensive National Nutrition Survey (CNNS) uniquely valuable compared to previous iterations of NFHS?
(A) It collected both anthropometric and biochemical biomarkers in children and adolescents.
(B) It was the first to use purely qualitative recall methods without standardized equipment.
(C) It was entirely self-reported through digital software applications by beneficiaries.
(D) It focused exclusively on the health profiles of adult males over fifty years of age.

46. Which target age group was explicitly covered for the first time with comprehensive biochemical profiling in the CNNS (2016-18)?
(A) Pregnant women aged 15 to 49 years
(B) Geriatric populations over 60 years
(C) Children and adolescents aged 0 to 19
(D) Adult male populations aged 20 to 50

47. Match the clinical signs of nutritional deficiency in List I with the deficient nutrients in List II.
List I: (Clinical sign of nutritional deficiency)
P. Bitot's spots
Q. Koilonychia (Spoon-shaped nails)
R. Bleeding gums (Scurvy)
S. Goitre
List II: (Deficient nutrient)
I. Iron
II. Iodine
III. Vitamin A
IV. Vitamin C
(A) P-III, Q-I, R-IV, S-II
(B) P-I, Q-III, R-II, S-IV

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basal metabolic rate of each individual
(D) To minimize memory decay and improve the accuracy of reported food intake data

16. What is the primary application of a Food Frequency Questionnaire (FFQ)?
(A) To measure precise daily caloric intake and individual energy expenditures accurately
(B) To comprehensively determine the biological safety of major drinking water sources
(C) To assess frequency of food intake over time to study diet-disease relationships
(D) To evaluate and document the immediate epidemiological impact of foodborne illnesses

17. Match the dietary assessment methods in List I with their primary limitations in List II.
List I: (Dietary assessment methods)
P. Weighed Food Record
Q. Dietary History
R. Food Frequency Questionnaire
S. 24-hour recall
List II: (Primary limitations)
I. May not capture total diet accurately and relies on a predefined food list
II. High respondent burden, may alter eating behaviour
III. Requires highly trained interviewers, prone to subjectivity
IV. Does not represent habitual intake if conducted only once
(A) P-II, Q-III, R-I, S-IV
(B) P-I, Q-II, R-IV, S-III
(C) P-II, Q-I, R-III, S-IV
(D) P-III, Q-IV, R-II, S-I

18. Consider the following statements regarding the Food Frequency Questionnaire (FFQ):
Statement I: A qualitative FFQ collects data on the frequency of consumption and the exact portion size of each food.
Statement II: A semi-quantitative FFQ provides standardized portion sizes to allow for the estimation of nutrient intake.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

19. Which of the following defines the "Weighed Food Record" method?
(A) All food and beverage items are weighed and recorded at the exact time of consumption.
(B) Respondents recall and estimate the weights of consumed items using specific memory aids.
(C) An interviewer estimates the physical weight of food using standard portion size guides.
(D) The statistical scaling of food frequency questionnaire data to match nutritional goals.

20. Consider the following statements regarding the advantages of the Weighed Food Record method:
I. It does not rely on the respondent's memory.
II. It is the most accurate method for determining exact portion sizes.
III. It is highly suitable for populations with low literacy rates.
IV. It requires minimal time and effort from the respondent.
Which of the above statement(s) is/are correct?
(A) I and II only
(B) I, II, and III only
(C) III and IV only
(D) I, II, III, and IV

21. Identify the correct statement regarding the design of a Food Frequency Questionnaire (FFQ).
(A) The food list must be specific to study objectives and culturally appropriate.
(B) The list must always include every single agricultural food item in the market.
(C) The format is entirely open-ended and contains no structured list of foods.
(D) The items selected will exclusively list vegetables and completely omit all fats.

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22. A researcher is conducting a massive epidemiological study involving 50,000 participants to find the link between long-term red meat consumption and colon cancer. Which method is most practically applicable?
(A) Seven-day weighed food record
(B) Repeated 24-hour dietary recall
(C) Direct observation of all meals
(D) Food Frequency Questionnaire

23. In the context of nutritional epidemiology, analyze the assertion and reason given below:
Assertion (A): The Food Frequency Questionnaire

(FFQ) is extensively used in large-scale chronic disease epidemiology.
Reason (R): The FFQ is inexpensive to administer to large groups and provides data on usual long-term dietary intake.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

24. All of the following dietary assessment methods primarily rely on the respondent's memory, EXCEPT:
(A) 24-hour dietary recall
(B) Dietary history
(C) Weighed food record
(D) Food Frequency Questionnaire

25. Identify the INCORRECT pair regarding dietary assessment methods and their reference timeframes.
(A) Weighed food record - Prospective
(B) 24-hour dietary recall - Retrospective
(C) Food Frequency Questionnaire - Retrospective
(D) Dietary history - Prospective

26. Arrange the following steps of the Weighed Food Record method in the correct operational sequence.
1. Weighing the cooked food portion taken on the plate
2. Weighing the raw ingredients prior to preparation
3. Weighing the plate waste/leftovers after eating
4. Recording the final net intake in the logbook

(A) 2, 1, 3, 4
(B) 1, 2, 4, 3
(C) 2, 3, 1, 4
(D) 1, 3, 2, 4

27. What is a common cause-and-effect relationship associated with the high respondent burden in the Weighed Food Record method?
(A) Respondents typically increase their physical activity levels and daily exercise.
(B) Respondents may alter their usual diet to simplify the recording process.
(C) Investigators consistently overreport the overall intake of key micronutrients.
(D) Respondents experience spontaneous improvements in their cognitive memory recall.

28. Identify the CORRECT pair regarding standard dietary history components.
(A) Component 1 - Comprehensive collection of blood for clinical biochemical analysis
(B) Component 2 - A 24-hour recall to determine the usual dietary pattern
(C) Component 3 - A three-day weighed food record mandatory for all active subjects
(D) Component 4 - A detailed clinical examination of visible physiological symptoms

29. Identify the INCORRECT statement regarding the design and validation of an FFQ.
(A) FFQs provide exact and precise absolute nutrient intake values without any measurement error.
(B) An FFQ should be validated against an independent reference method before use in a new population.
(C) The food list should capture items that account for the major variance in the nutrients of interest.
(D) The frequency categories usually range from 'never' to 'multiple times a day'.

30. Which dietary assessment method is generally considered the 'gold standard' for validating the actual intake of an individual in a clinical setting, despite its high burden?
(A) Single 24-hour recall
(B) Dietary history
(C) Weighed food record
(D) Qualitative FFQ

31. Which prominent institution was responsible for conducting the National Nutrition Monitoring Bureau (NNMB) surveys in India?
(A) Food Safety and Standards Authority of India (FSSAI)
(B) Ministry of Women and Child Development
(C) NITI Aayog
(D) National Institute of Nutrition (NIN), ICMR

32. Match the nutritional surveys/databases in List I with their key characteristics or focuses in List II.
List I: (Nutritional survey/database)
P. NNMB
Q. NFHS

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R. CNNS
S. NITI Aayog

List II: (Key characteristics)

I. First survey in India to collect a comprehensive set of biochemical markers in children
II. Conducted continuous diet and nutrition surveys specifically focusing on rural and tribal areas since 1972
III. Policy think-tank that utilizes survey data to form national indices
IV. Large scale multi-round survey providing state and national data on health, family welfare, and nutrition

(A) P-II, Q-IV, R-I, S-III
(B) P-I, Q-II, R-III, S-IV
(C) P-IV, Q-I, R-II, S-III
(D) P-II, Q-III, R-IV, S-I

33. Consider the following statements regarding national nutrition data in India:

Statement I: The NNMB strictly surveyed urban elite populations to set growth standards.

Statement II: The NFHS provides critical data on the prevalence of stunting, wasting, and underweight among children under five years of age.

(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

34. How is "stunting" defined in the context of the National Family Health Survey (NFHS)?

(A) Low weight for height, indicating acute malnutrition
(B) Low weight for age, representing a composite index of malnutrition
(C) Severe vitamin A deficiency leading to delayed bone growth
(D) Low height for age, reflecting chronic undernutrition

35. Consider the following findings associated with the National Family Health Survey-5 (NFHS-5):

I. A significant reduction in the prevalence of obesity across all states.
II. An alarming increase in the prevalence of anaemia among children and women.
III. An overall improvement in institutional deliveries.
IV. Complete eradication of childhood stunting in India.

Which of the above statement(s) is/are correct?

(A) I and IV only
(B) II and III only
(C) I, II, and III only
(D) II, III, and IV only

36. Identify the correct statement regarding the methodology traditionally used by the NNMB for assessing household dietary intake.

(A) It predominantly used the Food Frequency Questionnaire via online surveys.
(B) It relied solely on biochemical blood profiling of the head of the family.
(C) It utilized the one-day household diet survey by weighment method.
(D) It tracked grocery store purchase receipts over a period of one year.

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37. An FSO is analyzing NFHS data for a specific district and notices a high prevalence of wasting but low stunting. What does this conceptually indicate about the population's nutritional status?

(A) The population is experiencing recent, acute nutritional deficit or disease outbreak.
(B) The population has suffered from long-term, chronic deprivation but is currently well-fed.
(C) The population has an excess intake of dietary macronutrients leading directly to obesity.
(D) The population has severe endemic iodine deficiency resulting in metabolic dysfunction.

38. In the context of national health and nutrition assessments, analyze the assertion and reason given below:

Assertion (A): The Comprehensive National Nutrition Survey (CNNS) was a milestone in India's nutritional assessment history.

Reason (R): CNNS was the first national survey to collect biochemical samples to measure micronutrient deficiencies and non-communicable disease markers in children and adolescents.

(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

56. Based on WHO classification, what is the correct sequence of progression for clinical signs of Vitamin A deficiency (Xerophthalmia)?
1. Bitot's spots (X1B)
2. Night blindness (XN)
3. Keratomalacia (X3)
4. Corneal xerosis (X2)

(A) 2, 1, 4, 3
(B) 1, 2, 3, 4
(C) 2, 4, 1, 3
(D) 1, 4, 2, 3

57. What is the primary cause-and-effect relationship associated with observer bias in clinical nutritional surveys?
(A) Standardized clinical and biochemical laboratory tests yield inaccurate diagnostic results.
(B) An artificial increase in the prevalence of infectious diseases recorded during the survey.
(C) The subjects altering their typical daily diets due to the presence of an external examiner.
(D) Subjective misclassification of non-nutritional physical signs as deficiencies.

58. Identify the CORRECT pair regarding clinical signs of malnutrition.
(A) Pitting edema - Kwashiorkor
(B) Spongy bleeding gums - Vitamin A deficiency
(C) Enlarged thyroid gland - Iron deficiency
(D) Pallor of the mucous membrane - Zinc deficiency

59. Identify the INCORRECT statement regarding the limitations of clinical surveys.
(A) Many clinical signs are non-specific and can be caused by environmental factors like sun or wind exposure.
(B) Clinical surveys can detect sub-clinical and marginal deficiencies before any physical changes occur.
(C) Clinical signs can overlap, meaning one sign may indicate multiple deficiencies.
(D) Inter-observer variation is a significant challenge in clinical surveys.

60. What is the primary advantage of combining clinical examinations with biochemical assessments in surveys like the CNNS?
(A) It significantly reduces the total operational and logistical cost of conducting the survey.
(B) Biochemical tests detect early subclinical deficiencies before physical symptoms manifest.
(C) It completely eliminates any operational requirement to measure height and weight parameters.
(D) It directly enables field surveyors to prescribe complex therapeutic drugs on the spot.

61. Which biochemical marker is most commonly measured to assess the iron status and detect early iron deficiency in a population?
(A) Serum ferritin
(B) Serum albumin
(C) Blood glucose
(D) C-reactive protein

62. Match the biochemical tests/markers in List I with the nutrients they primarily assess in List II.

List I: (Biochemical test/marker)
P. Urinary iodine excretion
Q. Serum retinol
R. Hemoglobin
S. Serum 25-hydroxy vitamin D

List II: (Nutrient assessed)
I. Iron
II. Vitamin A
III. Vitamin D
IV. Iodine

(A) P-IV, Q-II, R-I, S-III
(B) P-II, Q-IV, R-III, S-I
(C) P-IV, Q-I, R-II, S-III
(D) P-I, Q-II, R-IV, S-III

63. Consider the following statements regarding Mid-Upper Arm Circumference (MUAC):
Statement I: A MUAC of less than 11.5 cm in children aged 6-59 months is an indicator of Severe Acute Malnutrition (SAM).
Statement II: MUAC measurements require complex mathematical calculations and cannot be performed by community health workers.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

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(C) P-III, Q-IV, R-I, S-II
(D) P-IV, Q-I, R-III, S-II

48. Consider the following clinical survey methods for nutritional assessment:
Statement I: Clinical examination is the most practical method for rapid nutritional assessment in large communities.
Statement II: Clinical signs are highly specific and always indicate a single, distinct nutrient deficiency.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

49. How is a "Clinical Survey" for nutritional assessment best defined?
(A) The precise chemical and laboratory analysis of blood, serum, and urine samples in a clinical setting
(B) The physical examination of superficial tissues like skin, eyes, and hair to detect deficiency signs
(C) The standardized measurement of bodily dimensions such as height and weight using calibrated tools
(D) The structured retrospective interviewing of subjects to quantify their exact daily food intake

50. Consider the following statements regarding the primary objectives of the Comprehensive National Nutrition Survey (CNNS):
I. To assess the prevalence of micronutrient deficiencies in children and adolescents.
II. To estimate the burden of non-communicable diseases (NCDs) markers in school-aged children.
III. To evaluate the exact market share of commercial fortified foods.
IV. To establish a national database for anthropometric and biochemical indicators.
Which of the above statement(s) is/are correct?
(A) I, II, and IV only
(B) I and II only
(C) II, III, and IV only
(D) I, II, III, and IV

51. Identify the correct statement regarding clinical signs of Protein-Energy Malnutrition (PEM).
(A) Flag sign (alternating bands of light and dark hair) is frequently observed in Kwashiorkor.
(B) Moon face, flaky paint dermatosis, and edema are classic clinical signs of Marasmus.
(C) Severe wasting of muscle and subcutaneous fat with a "monkey-like" face is characteristic of Kwashiorkor.
(D) PEM strictly presents with night blindness and xerophthalmia.

52. During a field survey, an FSO observes several children with angular stomatitis, cheilosis, and magenta tongue. Which specific nutrient deficiency should be most strongly suspected?
(A) Vitamin C (Ascorbic acid)
(B) Vitamin D (Calciferol)
(C) Vitamin B2 (Riboflavin)
(D) Vitamin K (Phylloquinone)

53. In the context of nutritional deficiency progression, analyze the assertion and reason given below:
Assertion (A): Clinical signs of nutritional deficiencies are often the last to appear in the progression of malnutrition.
Reason (R): The body first depletes tissue stores and undergoes biochemical changes before morphological changes become visible.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

54. All of the following are recognized clinical signs of Vitamin A deficiency, EXCEPT:
(A) Xerosis conjunctiva
(B) Bitot's spots
(C) Keratomalacia
(D) Casal's necklace

55. Identify the INCORRECT pair of a clinical sign and its associated deficiency.
(A) Petechiae - Vitamin C deficiency
(B) Pale conjunctiva - Iodine deficiency
(C) Rickets (Bow legs) - Vitamin D deficiency
(D) Pellagra (Dermatitis, Diarrhea, Dementia) - Niacin deficiency

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acts as primordial and primary prevention. Promoting healthy eating reduces the incidence of undernutrition and chronic diseases, lowering the long-term burden on health systems. This reduction in illness makes universal health services more financially sustainable and equitable for all.

149. (D) The One Health approach
Managing an avian influenza outbreak by culling infected poultry, monitoring farm workers, and tracking wild birds is a practical application of the One Health approach. This strategy coordinates actions across veterinary, occupational, and environmental sectors to control the zoonotic virus. This collaborative effort helps contain the infection, protecting both animal populations and human communities.

150. (B) One Health - Siloed, human-only clinical treatment approaches
The One Health paradigm is defined by collaborative, inter-sectoral action across human, animal, and environmental disciplines, making siloed, human-only clinical approaches incorrect. One Health moves beyond traditional medical boundaries to address zoonotic diseases, environmental health, and antimicrobial resistance, promoting integrated strategies to protect the health of all species and their shared ecosystems.

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64. What is the formal definition of Anthropometric measurements in the context of nutritional assessment?
(A) The evaluation of habitual diet quality through a structured lifestyle questionnaire.
(B) The clinical assessment of nutrient absorption rates in the gastrointestinal tract.
(C) The measurement of physical dimensions and gross composition of the body.
(D) The detailed microscopic examination of histopathological tissue biopsies.

65. Consider the following statements regarding the uses of skinfold thickness measurements in nutritional assessment:
I. To estimate subcutaneous fat reserves.
II. To determine total body muscle mass directly.
III. To indirectly estimate total body fat percentage.
IV. To precisely measure bone mineral density.
Which of the above statement(s) is/are correct?
(A) I and III only
(B) I, II, and III only
(C) II and IV only
(D) I, III, and IV only

66. Identify the correct statement regarding serum albumin as a biomarker.
(A) It serves as the most sensitive clinical biomarker for detecting acute protein shifts.
(B) It is exclusively utilized by clinicians to monitor complex carbohydrate metabolism.
(C) Abnormally low levels of serum albumin always indicate severe vitamin C deficiency.
(D) Its long half-life makes it an indicator of chronic rather than acute protein status.

67. A 30-year-old individual has a weight of 75 kg and a height of 1.70 m. Using the formula $BMI = \frac{\text{weight}}{\text{height}^2}$, which category does their Body Mass Index (BMI) fall into?
(A) Underweight
(B) Normal weight
(C) Overweight
(D) Obese Class II

68. In the assessment of population iodine status, analyze the assertion and reason given below:
Assertion (A): Median urinary iodine concentration (UIC) in spot urine samples is the recommended biochemical indicator for assessing iodine status in a population.
Reason (R): Over 90% of dietary iodine is excreted in the urine, making it an excellent reflection of recent dietary intake.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

69. All of the following tools are standard equipment used for anthropometric measurements in field surveys, EXCEPT:
(A) Spectrophotometer
(B) Infantometer
(C) Harpenden calipers
(D) Stadiometer

70. Identify the INCORRECT pair regarding anthropometric indices and their primary indication.
(A) Height-for-age - Chronic malnutrition (Stunting)
(B) Weight-for-height - Acute malnutrition (Wasting)
(C) Head circumference - Brain growth and development in infants
(D) BMI-for-age - Microcephaly

71. As a surveyor assessing the clinical nutritional status, how would you determine if an adolescent has Severe Acute Malnutrition using MUAC if the standard colour-coded tape is used?
(A) Yellow zone indicates Severe Acute Malnutrition.
(B) Red zone indicates Severe Acute Malnutrition.
(C) Green zone indicates Severe Acute Malnutrition.
(D) Blue zone indicates Severe Acute Malnutrition.

72. What is the cause-and-effect relationship of severe dehydration on the biochemical assessment of hemoglobin levels?
(A) It causes rapid systemic hemodilution, falsely decreasing measured hemoglobin.
(B) It destroys red blood cells directly, causing an immediate drop in hemoglobin.
(C) It causes hemoconcentration, falsely elevating levels and masking anemia.
(D) It halts the biological synthesis of hemoglobin entirely within twenty-four hours.

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73. Identify the CORRECT pair of anthropometric measurement and the instrument used to measure it.
(A) Standing height - Harpenden Skinfold Caliper
(B) Mid-Upper Arm Circumference - Stadiometer
(C) Body weight - Anthropometric measuring tape
(D) Recumbent length (under 2 years) - Infantometer

74. Identify the INCORRECT statement regarding the limitations of Body Mass Index (BMI).
(A) BMI distinguishes accurately between fat mass and muscle mass.
(B) BMI may overestimate adiposity in heavily muscled individuals, such as athletes.
(C) BMI does not account for the distribution of body fat (e.g., visceral vs subcutaneous).
(D) Different ethnic groups may have different health risks at the same BMI level.

75. Which of the following is considered a more sensitive and reliable biochemical indicator for assessing recent changes in visceral protein status due to its shorter half-life?
(A) Serum albumin concentration
(B) Prealbumin (Transthyretin)
(C) Blood urea nitrogen levels
(D) Serum creatinine clearance

76. The WHO Child Growth Standards (2006) were developed based on data from children who were raised in specific environments. What was a key characteristic of this reference population?
(A) They were fed exclusively on commercial milk and soy-based infant formulas.
(B) They were exclusively breastfed for at least the first four to six months.
(C) They represented only healthy pediatric cohorts from low-income countries.
(D) They were routinely introduced to solid foods starting at two months of age.

77. Match the Z-score cutoffs in List I with their corresponding nutritional classifications as per WHO standards in List II.
List I: (Z-score cutoff)
P. Below -3 SD (Weight-for-Height)
Q. Between -2 SD and -3 SD (Weight-for-Height)
R. Below -2 SD (Height-for-Age)
S. Above +2 SD (Weight-for-Height)
List II: (Nutritional classification)
I. Moderate Acute Malnutrition (MAM)
II. Overweight
III. Severe Acute Malnutrition (SAM)
IV. Stunting
(A) P-III, Q-I, R-IV, S-II
(B) P-I, Q-III, R-II, S-IV
(C) P-IV, Q-II, R-I, S-III
(D) P-III, Q-IV, R-I, S-II

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78. Consider the following statements regarding child growth charts:
Statement I: The Indian Academy of Pediatrics (IAP) recommends the use of WHO growth charts for monitoring the growth of children from 0 to 5 years.
Statement II: WHO growth charts describe how children "should grow" rather than just describing how a specific population "did grow".
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

79. How is a "Z-score" (standard deviation score) mathematically defined in growth monitoring?
(A) (Observed value + Median reference value) / Standard deviation of reference population
(B) (Median reference value - Observed value) × Standard deviation of reference population
(C) Observed value / (Median reference value × 100)
(D) (Observed value - Median reference value) / Standard deviation of reference population

80. Consider the following key features of the WHO Multicentre Growth Reference Study (MGRS):
I. It included children from diverse geographic regions (Brazil, Ghana, India, Norway, Oman, USA).
II. It established the breastfed infant as the normative model for growth and development.
III. It excluded children whose mothers smoked during pregnancy or lactation.
IV. It only measured weight and completely ignored length/height.
Which of the above statement(s) is/are correct?
(A) I and II only

(B) I, II, and III only
(C) II, III, and IV only
(D) I, II, III, and IV

81. Identify the correct statement regarding the interpretation of a growth curve trend on a WHO chart.
(A) A growth curve running parallel to the median reference line indicates abnormal growth.
(B) A sharp upward or downward crossing of percentile lines indicates a growth problem.
(C) A flat growth line representing no weight gain over a month is completely normal.
(D) The continuous trajectory of growth is less important than a single measurement.

82. In a rural Anganwadi center, a health worker plots a 3-year-old child's weight-for-height and notices it has dropped from the 50th percentile to below the 3rd percentile over three months. What does this conceptually indicate?
(A) A normal physiological growth spurt
(B) Chronic malnutrition leading to stunting
(C) The rapid onset of childhood obesity
(D) Acute malnutrition causing severe wasting

83. Analyze the assertion and reason given below regarding the WHO 2006 growth standards:
Assertion (A): The WHO 2006 growth standards resulted in an apparent increase in the prevalence of severe acute malnutrition (SAM) compared to the older NCHS references.
Reason (R): The WHO standards established a steeper, faster growth curve for the first 6 months of life based on the optimal growth of breastfed infants, making the criteria for normal weight more stringent.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

84. All of the following are standard growth indicators plotted on WHO child growth charts, EXCEPT:
(A) Weight-for-age measurements
(B) Length or height-for-age values
(C) Mid-upper arm circumference-for-height
(D) Body Mass Index (BMI)-for-age

85. Identify the INCORRECT pair regarding the equivalence between Z-scores and percentiles (approximate values).
(A) 0 Z-score = 50th percentile
(B) -2 Z-score = ~2.3rd percentile
(C) +2 Z-score = ~97.7th percentile
(D) -3 Z-score = 25th percentile

86. As a Food Safety Officer evaluating an ICDS center, you observe that an infant's weight-for-age plot shows a horizontal line for three consecutive months. What is the most appropriate action?
(A) Advise the mother to reduce feeding frequency to optimize gastrointestinal digestion.
(B) Disregard the trend, as flat horizontal growth curves are normal in early infancy.
(C) Conclude that the child is rapidly developing clinical signs of childhood obesity.
(D) Refer the infant for clinical assessment because growth faltering has occurred.

87. What is the direct cause-and-effect interpretation of a "flattening" or horizontal growth curve on a child's weight-for-age chart?
(A) It indicates an ideal, physiologically healthy stabilization of overall child body weight.
(B) It indicates growth faltering, often due to inadequate intake or recurrent infections.
(C) It indicates rapid catch-up growth and developmental recovery following acute illness.
(D) It reflects excessive dietary intake of simple carbohydrates causing fluid retention.

88. Identify the CORRECT pair regarding growth monitoring tools and their primary application setting.
(A) 'Road to Health' card - Diagnostic maternal tracking in obstetrics
(B) DEXA scan - Daily routine monitoring at local Anganwadi centers
(C) Shakir tape (MUAC) - Rapid screening of acute malnutrition
(D) Salter scale - Laboratory-level chemical analysis of blood

89. Identify the INCORRECT statement about the purpose and process of growth monitoring.
(A) It involves regular measurement of a child's physical growth.
(B) Plotting measurements on a chart makes growth visible to health workers and parents.

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curricula and cognitive tests for infant groups.
(D) Integrating health, nutrition, and early education services at the Anganwadi center.

106. In a normal rural or urban setting, what is the standard population threshold targeted for establishing one Anganwadi Centre under the ICDS?
(A) 100-200 population
(B) 400-800 population
(C) 1000-2000 population
(D) 5000-10000 population

107. Match the National Nutrition Programmes in List I with their specific core interventions in List II.
List I: (National Nutrition Programme)
P. NIDDCP
Q. NNAPP
R. WIFS
S. Vitamin A Prophylaxis Programme
List II: (Core intervention)
I. Biannual administration of massive doses of Retinol
II. Universal iodization of edible salt
III. Weekly administration of Iron and Folic Acid to adolescents
IV. Daily/regular Iron and Folic acid supplementation to vulnerable groups
(A) P-II, Q-IV, R-III, S-I
(B) P-I, Q-II, R-IV, S-III
(C) P-II, Q-III, R-IV, S-I
(D) P-III, Q-IV, R-I, S-II

108. Consider the following statements regarding the National Iodine Deficiency Disorders Control Programme (NIDDCP):
Statement I: The statutory requirement for iodine in edible salt is not less than 30 ppm at the manufacturing level.
Statement II: The statutory requirement for iodine in edible salt is not less than 15 ppm at the consumer level.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

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109. How is the "endemicity" of Iodine Deficiency Disorders defined in a specific geographical area?
(A) When the prevalence of goitre in school-age children is 5% or more
(B) When the prevalence of goitre in school-age children is 1% or more
(C) When at least one adult in the village has a visible goitre
(D) When urinary iodine levels exceed 300 μg/L

110. Consider the following components of the National Nutritional Anaemia Prophylaxis Programme (NNAPP) for pregnant women:
I. Provision of 100 mg elemental iron per tablet.
II. Provision of 500 μg of Folic Acid per tablet.
III. Mandatory consumption of the tablet for a minimum of 100 days during pregnancy.
IV. Provision of a massive dose of Vitamin A along with iron.
Which of the above statement(s) is/are correct?
(A) I, II, and III only
(B) I and III only
(C) II, III, and IV only
(D) I, II, III, and IV

111. Identify the correct statement regarding the roles of an Anganwadi Worker (AWW).
(A) She is fully responsible for conducting major surgical interventions in the village.
(B) She is legally authorized to prescribe oral antibiotics for childhood pneumonia.
(C) She operates as an extension worker purely under the Ministry of Agriculture.
(D) She links the health care system and the community to deliver ICDS services.

112. An FSO is advising local grocers on storing iodized salt to maintain its efficacy under NIDDCP guidelines. What conceptual principle should be applied?
(A) Store salt in direct intense sunlight to dry it and concentrate the iodine.
(B) Boil the edible salt thoroughly before selling to achieve complete sterilization.
(C) Store salt in sealed containers away from moisture, heat, and light.
(D) Mix the salt directly with mineral fertilizers to increase micronutrient contents.

113. Analyze the assertion and reason given below regarding Double Fortified Salt (DFS):
Assertion (A): Double Fortified Salt (DFS) has

97. If a primary school recipe under the MDM uses 100g of food grains, 20g of pulses, 50g of vegetables, and 5g of oil, what underlying concept does this recipe formation adhere to?
(A) Fulfilling the exact caloric standard of 700 Kcal for all primary students
(B) Meeting the primary student nutritional norm of 450 Kcal and 12g protein
(C) Eradicating dietary iron deficiencies with a single, fortified school meal
(D) Meeting the recommended daily macronutrient allowance for healthy adults

98. Analyze the assertion and reason given below regarding the Mid-Day Meal scheme:
Assertion (A): The Mid-Day Meal scheme has a dual objective of addressing both nutritional deficiency and educational deficits.
Reason (R): Providing a hot cooked meal attracts children to school, improves retention, and enhances concentration by alleviating classroom hunger.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

99. All of the following are primary target beneficiaries of the Integrated Child Development Services (ICDS), EXCEPT:
(A) Geriatric population above 65 years
(B) Children in the age group of 0-6 years
(C) Pregnant women
(D) Lactating mothers

100. Identify the INCORRECT pair regarding the service provider and the ICDS service delivered at the Anganwadi centre.
(A) Anganwadi Worker - Non-formal Pre-school Education
(B) ANM / Medical Officer - Immunization
(C) Medical Officer - Daily cooking of the hot meal
(D) Anganwadi Worker - Supplementary Nutrition distribution

101. An FSO investigates an outbreak of food poisoning in a school covered under PM POSHAN. Which action demonstrates correct competency in this scenario?
(A) Collect cooked food, raw ingredient, and water samples for clinical analysis.
(B) Immediately suspend the entire nutrition scheme permanently across the district.
(C) Administer clinical antibiotics to all students without consulting medical officers.
(D) Declare the stored food grains highly toxic without conducting laboratory tests.

102. What is a well-documented positive cause-and-effect outcome of the Mid-Day Meal scheme on the educational sector in India?
(A) A sudden and drastic decrease in the total count of active female schoolteachers.
(B) A substantial reduction in the mandatory number of school days per academic year.
(C) Immediate and dramatic improvements in secondary school board examination results.
(D) Increased school enrollment and attendance, especially among marginalized groups.

103. Identify the CORRECT pair of ICDS target group and their specific nutritional intervention norm.
(A) Pregnant and lactating mothers - 600 Kcal and 18-20g protein per day
(B) Normal children (6 months to 6 years) - 500 Kcal and 12-15g protein
(C) Severely malnourished children - 800 Kcal and 20-25g protein per day
(D) Adolescent girls under the scheme - 600 Kcal and 18-20g protein daily

104. Identify the INCORRECT statement regarding the PM POSHAN (Mid-Day Meal) guidelines.
(A) It encourages the use of 'School Nutrition Gardens' to provide fresh vegetables.
(B) It encourages the inclusion of fortified food items to combat micronutrient deficiencies.
(C) It mandates that the meal be served only in the form of dry rations on standard school days.
(D) It includes the concept of "Tithi Bhojan", where community members can provide special food on festivals.

105. What is the core strategy of the Integrated Child Development Services (ICDS) to achieve holistic child development?
(A) Providing highly specialized clinical and tertiary healthcare at the local village level.
(B) Providing direct financial cash transfers of high monetary value in lieu of all services.
(C) Focusing strictly on formal academic

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S. NFSM-Nutri-Cereals

List II: (Primary focus crop)

I. Millets like Sorghum, Pearl Millet, and Finger Millet
II. Increasing production of paddy in target districts
III. Increasing production of chickpea, pigeon pea, and lentils
IV. Maize and Barley

(A) P-II, Q-III, R-IV, S-I
(B) P-I, Q-II, R-III, S-IV
(C) P-II, Q-IV, R-I, S-III
(D) P-III, Q-I, R-II, S-IV

123. Consider the following statements regarding the Weekly Iron and Folic Acid Supplementation (WIFS) programme:

Statement I: The weekly dose consists of 100 mg of elemental iron and 500 μg of folic acid (blue tablet).

Statement II: The programme includes biannual deworming using Albendazole.

(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

124. How is "Food Security" broadly defined in the context of the National Food Security Mission and related national policies?

(A) The strict physical and military protection of agricultural land from foreign invasion.
(B) Physical and economic access to safe and nutritious food to meet dietary needs.
(C) The mass production of synthetic foods to completely replace agricultural dependency.
(D) Ensuring that all households have direct access exclusively to high-protein meat.

125. Consider the following objectives of the SABLA (Rajiv Gandhi Scheme for Empowerment of Adolescent Girls):

I. To improve the nutritional and health status of adolescent girls (11-18 years).
II. To upgrade their home-based skills, life skills, and vocational skills.
III. To completely replace the regular school curriculum with vocational training.
IV. To provide information on family welfare, health, and hygiene.

Which of the above statement(s) is/are correct?

(A) I, II, and III only
(B) I, II, and IV only
(C) II, III, and IV only
(D) I, III, and IV only

126. Identify the correct statement regarding the deworming component under the WIFS programme.

(A) Deworming of school children is completely unnecessary if daily iron tablets are provided.
(B) Deworming tablets are administered on a daily schedule directly alongside the iron tablets.
(C) Biannual administration of Albendazole is conducted to control helminthic infestation.
(D) Only female adolescent students receive the deworming tablets under this specific programme.

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127. An FSO notes high non-compliance in a school WIFS programme because students report nausea and stomach pain after taking the tablets. What conceptual application should be advised to mitigate these side effects?

(A) Advise students to consume the tablet on an empty stomach first thing in the morning.
(B) Crush the tablet and mix it directly into boiling milk prior to oral administration.
(C) Halt the oral supplementation programme and switch entirely to intravenous iron therapies.
(D) Advise students to take the tablet after a meal, typically after the Mid-Day Meal.

128. Analyze the assertion and reason given below regarding the SABLA scheme:

Assertion (A): The SABLA scheme includes a specific focus on out-of-school adolescent girls.

Reason (R): Out-of-school girls are highly vulnerable to early marriage, poor nutritional status, and lack of awareness regarding reproductive health.

(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

129. When the National Food Security Mission (NFSM) was originally launched in 2007, it

been introduced in various nutrition safety net programs.
Reason (R): DFS contains both Iodine and Iron, simultaneously targeting two major micronutrient deficiencies (goitre and anaemia) using a single, universally consumed vehicle.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

114. All of the following clinical manifestations or consequences of Iodine Deficiency Disorders (IDD) are correct, EXCEPT:
(A) Endemic cretinism
(B) Goitre
(C) Neonatal hypothyroidism
(D) Beriberi

115. Identify the INCORRECT pair regarding registers maintained at an Anganwadi center and their purpose.
(A) Criminal Record Register - Tracks minor offenses committed by adolescents
(B) Growth Monitoring Register - Records weights and heights of children
(C) Supplementary Food Stock Register - Tracks the inventory of rations received and distributed
(D) Immunization Register - Tracks the vaccine doses given to children and pregnant women

116. As a health worker under the Anaemia Mukt Bharat strategy (which subsumed NNAPP norms), what is the correct prophylactic dosage of Iron and Folic Acid (IFA) for a non-anaemic pregnant woman?
(A) One standard IFA tablet weekly starting from the first day of conception.
(B) Two standard IFA tablets daily starting directly from the first trimester.
(C) One IFA tablet daily from the second trimester for at least 180 days.
(D) One concentrated pediatric oral syrup dose of iron administered per month.

117. What is the direct cause-and-effect consequence of severe maternal iodine deficiency during pregnancy?
(A) The infant is born with neurological cretinism and cognitive deficits.
(B) The mother develops clinical gestational diabetes during the third trimester.
(C) The newborn infant develops macrocytic anaemia immediately at birth.
(D) The mother experiences severe postpartum rapid weight loss and clinical scurvy.

118. Identify the CORRECT pair regarding monitoring tools used in the NIDDCP.
(A) Clinical assessment tool - Physical measurement of waist circumference
(B) Diet assessment tool - A seven-day weighed food record of vegetables
(C) Quality control tool - Quantifying the level of elemental iron in rice
(D) Biochemical assessment tool - Estimation of urinary iodine excretion

119. Identify the INCORRECT statement regarding the challenges faced by the Anganwadi system.
(A) Inadequate infrastructure and lack of proper buildings in many rural areas.
(B) Overwhelming excess of highly trained medical doctors stationed at every center.
(C) Excessive workload and multiple non-ICDS duties assigned to Anganwadi Workers.
(D) Irregular supply of supplementary nutrition rations in some regions.

120. What is the most appropriate and widely accepted primary biomarker for monitoring the iodine status of a population under the NIDDCP?
(A) Serum thyroxine (T4) levels
(B) Thyroid Stimulating Hormone (TSH) in adults
(C) Median Urinary Iodine Concentration (UIC)
(D) Serum iodine levels

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121. The Weekly Iron and Folic Acid Supplementation (WIFS) programme primarily targets which demographic group?
(A) Pregnant women and lactating mothers
(B) Geriatric population (above 60 years)
(C) Infants below 1 year
(D) Adolescent girls and boys (10-19 years)

122. Match the National Food Security Mission (NFSM) sub-missions/components in List I with their primary focus crops in List II.
List I: (NFSM sub-mission/component)
P. NFSM-Rice
Q. NFSM-Pulses
R. NFSM-Coarse Cereals

(C) It helps in the early detection of growth faltering before clinical malnutrition sets in.
(D) It is solely a diagnostic tool and has no educational value for the mother.

90. What is the primary utility of the 'Road to Health' growth chart used in ICDS and primary health care?
(A) To monitor child growth, track immunization, and provide maternal health education
(B) To record comprehensive maternal dietary and nutritional intake during pregnancy
(C) To act as an official legal document required for child birth certification
(D) To track and estimate the exact daily metabolic and caloric expenditure of a child

91. The historic "Mid-Day Meal (MDM) Scheme" was recently revamped and renamed. What is its current official name?
(A) PM KISAN
(B) PM POSHAN (Pradhan Mantri Poshan Shakti Nirman)
(C) PM GARIB KALYAN ANNA YOJANA
(D) PM MATRU VANDANA YOJANA

92. Match the target groups under the PM POSHAN / Mid-Day Meal scheme in List I with their nutritional norms per child per school day in List II.
List I: (Target group)
P. Primary (Classes I-V) Calories
Q. Primary (Classes I-V) Protein
R. Upper Primary (Classes VI-VIII) Calories
S. Upper Primary (Classes VI-VIII) Protein
List II: (Nutritional norm)
I. 700 Calories
II. 450 Calories
III. 20 grams
IV. 12 grams
(A) P-II, Q-IV, R-I, S-III
(B) P-I, Q-III, R-II, S-IV
(C) P-II, Q-III, R-I, S-IV
(D) P-I, Q-IV, R-II, S-III

93. Consider the following statements regarding the Integrated Child Development Services (ICDS) in India:
Statement I: It is purely a State government funded scheme with no financial contribution from the Central government.
Statement II: Supplementary Nutrition and Non-formal Pre-school Education are core components of ICDS.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

94. Under the ICDS, what is the definition/norm of the Supplementary Nutrition Programme (SNP) for severely malnourished children (6-72 months)?
(A) 500 calories and 12-15 grams of protein per day
(B) 800 calories and 20-25 grams of protein per day
(C) 1000 calories and 30 grams of protein per day
(D) 1200 calories and 40 grams of protein per day

95. Consider the following services provided under the Integrated Child Development Services (ICDS) scheme:
I. Supplementary Nutrition
II. Immunization
III. Tertiary surgical care
IV. Health and Nutrition Education
Which of the above services are included in the standard package of six services?
(A) I and II only
(B) I, II, and IV only
(C) II, III, and IV only
(D) I, II, III, and IV

96. Identify the correct statement regarding the food grain allocation mechanism for the PM POSHAN (Mid-Day Meal) scheme.
(A) Food grains are imported directly from various foreign trade agreements specifically for this scheme.
(B) Schools are legally mandated to purchase food grains solely from private supermarkets at market rates.
(C) The Food Corporation of India provides subsidized food grains under the National Food Security Act.
(D) The national guidelines of the scheme strictly prohibit the culinary use of locally grown millets.

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specifically focused on increasing the production of all the following crops, EXCEPT:
(A) Rice
(B) Sugarcane
(C) Wheat
(D) Pulses

130. Identify the INCORRECT pair regarding components of the SABLA scheme.
(A) Nutrition Provision - 600 Kcal and 18-20g protein per day for 300 days in a year
(B) Target group for nutrition - Out-of-school girls 11-14 years, and all girls 15-18 years
(C) IFA Supplementation - Provided in coordination with health departments
(D) Cash Transfer Component - A monthly stipend of Rs. 5000 directly to the beneficiary

131. A block medical officer observes a 50% drop-out rate in WIFS compliance among boys in secondary school. As a competent health official, what is the most likely reason to investigate first?
(A) A misconception that the tablet is meant only for girls or causes infertility.
(B) The widespread preference among boys for different fruit flavours of the tablet.
(C) A false belief that adolescent boys are naturally immune to developing anaemia.
(D) An absurd physiological rumor that the tablets instantly dissolve in open air.

132. What was the cause-and-effect relationship intended by the introduction of High Yielding Varieties (HYV) and improved farm practices under the NFSM?
(A) Decreased overall soil fertility leading directly to localized agricultural famine.
(B) Complete elimination of traditional pulse farming in favour of lucrative cash crops.
(C) Increased crop productivity and production to enhance national food security.
(D) A sudden, drastic reduction in total agricultural employment opportunities.

133. Identify the CORRECT pair of the nutrition/ food programme and its focal nodal Ministry at the Central level.
(A) PM POSHAN (Mid-Day Meal) - Ministry of Education
(B) ICDS - Ministry of Agriculture
(C) NFSM - Ministry of Health and Family Welfare
(D) NIDDCP - Ministry of Women and Child Development

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134. Identify the INCORRECT statement regarding the National Food Security Mission (NFSM).
(A) It was launched as a Centrally Sponsored Scheme.
(B) Its primary objective was to increase the production of rice, wheat, and pulses through area expansion and productivity enhancement.
(C) It focuses on restoring soil fertility and productivity at the individual farm level.
(D) It provides absolutely no financial assistance or subsidies to farmers for purchasing seeds or machinery.

135. What is the most appropriate reason for integrating nutrition provision with life skills and vocational training in the SABLA scheme?
(A) To systematically prepare and force adolescent girls into early manual child labour at factories.
(B) To achieve holistic empowerment as physical health and vocational skills are interdependent.
(C) To reduce the financial burden on primary schools by transferring teaching duties to Anganwadi workers.
(D) To train and prepare them exclusively to become future professional Anganwadi workers in the future.

136. What does the "+F" logo mandated by the FSSAI signify on a food product package?
(A) The food is completely free from fat.
(B) The food contains artificial chemical food coloring.
(C) The food is fortified with essential micronutrients.
(D) To meant exclusively for international trade.

137. Match the fortified staple foods in List I with the primary micronutrients recommended for fortification by FSSAI in List II.
List I: (Fortified staple food)
P. Edible Oil
Q. Milk
R. Wheat Flour (Atta)
S. Double Fortified Salt
List II: (Primary micronutrients)
I. Iron, Folic Acid, and Vitamin B12
II. Vitamin A and Vitamin D

III. Vitamin A and Vitamin D
IV. Iodine and Iron
(A) P-II, Q-III, R-I, S-IV
(B) P-I, Q-II, R-IV, S-III
(C) P-IV, Q-I, R-II, S-III
(D) P-III, Q-IV, R-I, S-II

138. Consider the following statements regarding the Food Fortification Resource Centre (FFRC):
Statement I: It was established by FSSAI in collaboration with Tata Trusts.
Statement II: Its primary role is to act as a resource hub providing technical support, capacity building, and advocacy for food fortification in India.
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.

139. How is "Biofortification" distinctly defined in contrast to conventional food fortification?
(A) Adding synthetic chemical nutrient powders to food products during commercial post-harvest processing.
(B) Enhancing crop nutritional quality via breeding or biotechnology during the plant growth phase.
(C) Encapsulating essential micronutrients in biological membranes before adding them to table salt.
(D) Applying standard fortification practices exclusively to foods that are certified as organic.

140. Consider the following statements regarding FSSAI's mandates and initiatives in social safety net programmes:
I. FSSAI has mandated the use of fortified oil, milk, and salt in the Mid-Day Meal and ICDS schemes.
II. FSSAI provides financial grants directly to schools to buy fortified foods.
III. Fortified wheat flour and rice are heavily promoted for use in the Public Distribution System (PDS).
IV. FSSAI strictly prohibits the use of fortified foods in government schemes to prevent hypervitaminosis.
Which of the above statement(s) is/are correct?
(A) I and III only
(B) II and IV only
(C) I, II, and III only
(D) I, III, and IV only

141. Identify the correct statement regarding the level of fortification for Milk under FSSAI regulations.
(A) Milk is fortified with Vitamin A (270-330 μg RE/L) and Vitamin D (5-7.5 μg/L).
(B) Milk must be fortified with high amounts of Vitamin C and active zinc minerals.
(C) Only skimmed milk can be fortified, while standard toned milk is fully exempted.
(D) Fortification of milk specifically requires adding direct solid iron particles.

142. A food technologist is formulating Double Fortified Salt (DFS). Which specific form of iron is conceptually most appropriate to prevent adverse colour changes and iodine loss during storage?
(A) Ferrous sulphate without any encapsulation
(B) Raw Iron filings
(C) Encapsulated Ferrous Fumarate
(D) Ferric chloride

143. Analyze the assertion and reason given below regarding food fortification:
Assertion (A): Food fortification is promoted by the government as a complementary strategy to address micronutrient malnutrition.
Reason (R): Fortification is cost-effective, does not require changes in dietary habits, and delivers nutrients through widely consumed staples, though it does not replace the need for a diverse diet.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

144. All of the following are the primary staple foods currently identified and regulated for large-scale fortification by FSSAI, EXCEPT:
(A) Rice
(B) Wheat Flour
(C) Refined Sugar
(D) Edible Oil

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145. Identify the INCORRECT pair regarding the fortificant compound and its targeted staple food under standard practices.
(A) Potassium iodate - Edible Salt
(B) Calcium carbonate - Bottled mineral water
(C) Retinyl palmitate - Edible Oil
(D) Ferric pyrophosphate - Extruded fortified rice kernels

146. A consumer complains that the fortified rice supplied via the PDS turns slightly grey upon washing. As an FSO, what is the most scientifically sound competency-based response?
(A) Confiscate the entire rice batch immediately as it is highly adulterated with toxic lead.
(B) Instruct the consumer to thoroughly wash the rice with bleach to restore the white color.
(C) Shut down the local PDS retail shop immediately for selling apparently rotten grain products.
(D) Explain that iron fortificants may cause slight discoloration with moisture but remain safe.

147. What is a primary cause-and-effect consequence of poor inter-sectoral coordination (e.g., between Health, WCD, and Education ministries) in India's nutrition programmes?
(A) Overlapping target groups, fragmented resources, and suboptimal impacts on nutrition.
(B) The seamless, efficient delivery of all welfare and healthcare services precisely on time.
(C) The rapid and immediate eradication of all forms of childhood obesity nationwide.
(D) A drastic, immediate reduction in the overall national fiscal deficit and spending.

148. Identify the CORRECT pair linking a key achievement to its respective nutrition programme in India.
(A) Complete structural elimination of child stunting across all states - ICDS
(B) Total clinical eradication of chronic iron deficiency anaemia - NNAPP
(C) Near-universal coverage of iodized salt in over 70% of households - NIDDCP
(D) Achieving 100% self-sufficiency in domestic pulse production within a year - NFSM

149. Identify the INCORRECT statement regarding the structure and function of the Food Fortification Resource Centre (FFRC).
(A) It is a regulatory enforcement wing that conducts raids and arrests non-compliant millers.
(B) It is established under the FSSAI.
(C) It acts as a single point of contact for stakeholders seeking guidance on fortification.
(D) It works to generate awareness among consumers regarding the benefits of fortified foods.

150. Despite numerous programmes, what remains the most significant, overarching challenge in completely eradicating malnutrition in India?
(A) The perceived complete lack of any government schemes or social policies addressing nutrition.
(B) The total lack and chronic unavailability of trained medical professionals in urban centers.
(C) The complete absence of basic agricultural and industrial food production in the country.
(D) Poverty, cultural dietary taboos, poor sanitation, and inequitable resource distribution.

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body weight with a calibrated weighing scale, and mid-upper arm circumference with a standardized non-stretchable measuring tape.

74. (A) BMI distinguishes accurately between fat mass and muscle mass.
A primary limitation of Body Mass Index is its inability to distinguish between fat mass and lean muscle mass. Because it relies solely on total weight and height, it can misclassify muscular individuals, such as athletes, as overweight or obese. Additionally, it does not provide information regarding the physical distribution of adipose tissue within the body.

75. (B) Prealbumin (Transthyretin)
Prealbumin, also known as transthyretin, is a sensitive biochemical indicator for monitoring acute changes in visceral protein status. It has a short half-life of approximately two days, which allows it to reflect rapid changes in protein intake and nutritional support. This makes it superior to albumin, which has a longer half-life and responds slowly to interventions.

76. (B) They were exclusively breastfed for at least the first four to six months.
The World Health Organization Child Growth Standards were developed based on a reference population of healthy children raised under optimal environmental conditions. A key eligibility criterion was that these infants were exclusively or predominantly breastfed for at least the first four to six months of life. This established breastfeeding as the normative physiological model for human infant growth.

77. (A) P-III, Q-I, R-IV, S-II
The World Health Organization uses standard deviation Z-score cutoffs to classify pediatric nutritional status. A weight-for-height Z-score below minus three standard deviations indicates severe acute malnutrition, while a score between minus two and minus three indicates moderate acute malnutrition. A height-for-age Z-score below minus two indicates stunting, and a weight-for-height score above plus two indicates overweight.

78. (A) Both Statement I and Statement II are correct.
The Indian Academy of Pediatrics recommends using World Health Organization growth charts to monitor child development up to five years. These charts are prescriptive rather than descriptive, illustrating how children should grow under optimal conditions. By establishing breastfed infants as the normative standard, they provide a universal tool for evaluating growth across different populations.

79. (D) (Observed value - Median reference value) / Standard deviation of reference population
In growth monitoring, a Z-score is a standardized value that expresses an individual's measurement relative to a reference population. Mathematically, it is calculated by subtracting the median reference value from the observed measurement, and then dividing this difference by the standard deviation of the reference population. This score indicates how far an individual deviates from the reference median.

80. (B) I, II, and III only
The Multicentre Growth Reference Study included healthy children from diverse geographic regions to ensure international applicability. It established breastfed infants as the biological norm and excluded children whose mothers smoked during pregnancy or lactation, as maternal smoking negatively impacts fetal growth. The study measured multiple anthropometric parameters, including weight, length, height, and head circumference, over time.

81. (B) A sharp upward or downward crossing of percentile lines indicates a growth problem.
Interpreting trends on a growth chart is crucial for assessing child health. A growth curve that runs parallel to the median reference line indicates healthy, consistent growth. In contrast, a flat line indicating no weight gain, or a sharp upward or downward crossing of percentile lines, suggests a potential growth problem that requires immediate clinical evaluation.

82. (D) Acute malnutrition causing severe wasting
A child's weight-for-height index reflects recent body mass relative to linear growth. If a three-year-old child's weight-for-height plot drops significantly from the fiftieth percentile to below the third percentile over a short period, it indicates rapid weight loss. This sharp downward trend is a classic indicator of acute malnutrition, resulting in clinical wasting.

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estimate consumed volumes. These physical tools minimize memory-related portion size estimation errors. Conversely, biochemical reagent kits are laboratory diagnostic tools used to analyze biological samples and are never utilized during dietary interviews.

10. (A) Weighed food record - Exact duration of digestion in the stomach
Dietary assessment methods are defined by specific reference timeframes. The weighed food record is a prospective method where food is weighed and recorded immediately prior to consumption, not during gastric digestion. In contrast, the twenty-four-hour recall is retrospective for the previous day, while food frequency questionnaires and dietary histories evaluate typical intake over weeks, months, or years.

11. (A) 3, 1, 2, 4
Conducting a standardized twenty-four-hour recall involves systematic, sequential steps to ensure high data quality. The investigator first obtains a quick list of all foods consumed, then probes for forgotten items to address memory gaps. Next, portion sizes are carefully estimated using household measures. Finally, a thorough review and verification of the recorded data are completed with the respondent.

12. (B) It causes underreporting of unhealthy foods and overreporting of healthy choices.
Social desirability bias significantly distorts self-reported dietary data in surveys. This cognitive bias occurs when respondents alter their reported intake to present a more favorable self-image to the investigator. Consequently, individuals frequently underreport the consumption of foods perceived as unhealthy, such as high-fat or sugary items, while overreporting the intake of healthy foods like vegetables.

13. (A) Recall bias - Inability to accurately remember foods eaten
Recall bias is a common retrospective error arising from a respondent's inability to accurately remember and report past dietary intake. This differs from observer bias, which involves systematic errors introduced by the investigator. Reactivity occurs when individuals modify their actual eating habits because they are being observed, while selection bias relates to non-random study participant recruitment.

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14. (C) It is highly objective and does not depend on the skill of the interviewer.
The dietary history method is a highly subjective assessment tool that relies heavily on the skill and experience of the interviewer. It requires detailed questioning to elicit habitual dietary patterns over long periods, making it prone to interviewer bias. This extensive, open-ended nature makes the method time-consuming and difficult to standardize across large-scale population surveys.

15. (D) To minimize memory decay and improve the accuracy of reported food intake data
The multiple-pass approach is a structured interviewing technique designed to minimize memory decay during dietary recalls. By guiding the respondent through several systematic steps—including a quick list, detailed probing, and final verification—it helps retrieve forgotten foods and drinks. This rigorous process significantly enhances the overall quality and accuracy of the collected self-reported intake data.

16. (C) To assess frequency of food intake over time to study diet-disease relationships
The food frequency questionnaire is specifically designed to assess the long-term habitual consumption of specific food items over extended periods. By focusing on the frequency of intake, it ranks individuals according to their typical consumption levels. This ranking is crucial in nutritional epidemiology for investigating potential associations between specific dietary patterns and the development of chronic diseases.

17. (A) P-II, Q-III, R-I, S-IV
Each dietary assessment method possesses distinct limitations. Weighed food records impose a high respondent burden that can alter eating behaviors. Dietary histories require highly trained interviewers, introducing potential subjectivity. Food frequency questionnaires depend on predefined lists, which may not capture total diets. Single twenty-four-hour recalls fail to represent habitual intake because of day-to-day variation.

18. (D) Statement I is incorrect and Statement II is correct.
Qualitative food frequency questionnaires only gather information on the frequency of consumption without detailing portion sizes. Conversely, semi-quantitative versions provide standardized, pre-defined portion sizes alongside frequency questions, which enables researchers

ANSWERS

1. (B) To assess qualitative and quantitative dietary intake to determine nutritional status
Dietary surveys serve as a fundamental tool in public health nutrition to systematically evaluate what people eat. By measuring both the types and quantities of food consumed, these assessments allow researchers to calculate precise nutrient intakes. Ultimately, this data helps determine the nutritional status of the community, identifying deficiencies or excesses to guide effective interventions.

2. (A) P-II, Q-IV, R-I, S-III
Different dietary assessment tools serve unique research purposes based on their specific methodology. The twenty-four-hour recall relies heavily on retrospective memory of the previous day, whereas weighed food records physically measure food before consumption. Food frequency questionnaires capture long-term qualitative consumption patterns, while comprehensive dietary histories evaluate typical habitual food intake over extended, prolonged periods of time.

3. (D) Statement I is incorrect and Statement II is correct.
The twenty-four-hour dietary recall does not require highly educated respondents, making it highly versatile for diverse populations. During the interview process, the investigator utilizes standardized measuring tools, such as cups and spoons, to help the respondent estimate portion sizes accurately. This active involvement of the trained investigator minimizes errors associated with self-reporting and portion size estimation.

4. (C) A systematic assessment of food and fluid intake in a population over a specific timeframe
A dietary survey is a structured scientific method used to collect quantitative and qualitative information regarding food and fluid consumption. It monitors intake patterns within a designated target population over a specific, defined timeframe. This assessment provides critical baseline data needed to understand eating habits, nutrient adequacy, and potential dietary risks across different demographic groups.

5. (B) I, III, and IV only
The twenty-four-hour dietary recall method has several inherent limitations, particularly its reliance on the retrospective memory of the respondent. A single day's recall rarely represents an individual's habitual, long-term intake due to daily variations. Additionally, it is prone to flat-slope syndrome, where low consumers tend to overreport and high consumers tend to underreport their food intake.

6. (D) It is highly suitable for large-scale population studies due to its rapid administration.
The twenty-four-hour dietary recall is highly advantageous for large-scale epidemiological studies because it is quick to administer and carries a low respondent burden. Unlike prospective methods, it does not alter habitual eating behaviors. Although a single recall does not reflect individual habitual intake, it provides a highly reliable estimate of mean intake for large population groups.

7. (B) Repeated 24-hour dietary recall
To assess the average intake of a nutrient like protein in large populations under budget constraints, a repeated twenty-four-hour recall is the most suitable approach. This method reduces individual day-to-day variation while maintaining low investigator and respondent burden. It provides a highly feasible and cost-effective alternative to expensive, highly demanding prospective recording methods.

8. (C) A is true but R is false.
The twenty-four-hour recall is widely used in national nutrition surveys due to its simplicity, speed, and low respondent burden. However, it is a dietary assessment tool and cannot measure trace minerals stored in the body. Biological tissue storage of micronutrients must be evaluated using specific biochemical laboratory parameters rather than retrospective food intake interviews.

9. (D) Biochemical reagent kits
During a twenty-four-hour recall, investigators use various practical aids like standardized household utensils, food photographs, and raw-to-cooked conversion tables to help respondents accurately

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eating out less frequently. This behavioral change introduces reactivity bias, meaning the recorded data may not represent their normal habitual diet.

28. (B) Component 2 - A 24-hour recall to determine the usual dietary pattern
A standard dietary history, originally developed by Burke, typically consists of three interrelated components. The first component is an in-depth interview regarding the usual pattern of eating. The second component is a detailed twenty-four-hour recall used to cross-check and verify the habitual pattern. The third component is a three-day food record to provide additional quantitative data.

29. (A) FFQs provide exact and precise absolute nutrient intake values without any measurement error.
Food frequency questionnaires are valuable tools for ranking individuals based on nutrient intake, but they do not provide exact, error-free absolute nutrient values. They are prone to measurement errors due to memory limitations, misestimation of portion sizes, and a closed list of foods. Therefore, validating them against independent reference methods is critical before population-level application.

30. (C) Weighed food record
Although demanding, the weighed food record is widely considered the gold standard for validating other dietary assessment methods in clinical research. This method eliminates recall bias by requiring real-time weighing and recording of all consumed items. It provides highly accurate quantitative data on actual intake, making it an excellent reference standard for evaluating the validity of retrospective tools.

31. (D) National Institute of Nutrition (NIN), ICMR
The National Nutrition Monitoring Bureau was established in 1972 by the Indian Council of Medical Research. The bureau was physically located at the National Institute of Nutrition in Hyderabad. This institution played a pivotal role in planning, executing, and analyzing these nationwide surveys, providing vital long-term data on the dietary intake and nutritional status of Indian populations.

32. (A) P-II, Q-IV, R-I, S-III
India's nutritional landscape is monitored through various surveys and institutions. The National Nutrition Monitoring Bureau has assessed rural and tribal dietary trends since 1972. The National Family Health Survey provides national data on maternal and child health. The Comprehensive National Nutrition Survey was the first to collect national pediatric biochemical markers, while NITI Aayog formulates data-driven policy indices.

33. (D) Statement I is incorrect and Statement II is correct.
The National Nutrition Monitoring Bureau was established to survey rural and tribal populations, not urban elites. Conversely, the National Family Health Survey provides crucial, nationally representative data on health and nutritional indicators, including the prevalence of stunting, wasting, and underweight among young children. Thus, the former focuses on rural cohorts while the latter monitors key childhood malnutrition indicators.

34. (D) Low height for age, reflecting chronic undernutrition
In national health assessments like the National Family Health Survey, child growth indicators are strictly defined. Stunting is defined as having a height-for-age Z-score below minus two standard deviations from the reference median. This condition represents chronic undernutrition, reflecting long-term nutritional deprivation, recurrent illnesses, and poor socio-economic conditions that permanently hinder linear physical growth.

35. (B) II and III only
Findings from the fifth National Family Health Survey highlighted critical public health trends in India. The data revealed a persistent, concerning rise in the prevalence of anemia among children and women. However, the survey also documented positive developments, particularly a significant improvement in institutional deliveries across the country, showing enhanced access to maternal healthcare services.

36. (C) It utilized the one-day household diet survey by weighment method.
The National Nutrition Monitoring Bureau historically used a highly standardized methodology to assess household food consumption in India. This involved a one-day household diet

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55. (B) Pale conjunctiva - Iodine deficiency
Associating pale conjunctiva with iodine deficiency is incorrect because pale mucous membranes and conjunctiva are classic clinical indicators of anemia, which is primarily caused by iron deficiency. Iodine deficiency instead manifests as goiter or thyroid enlargement. Other pairings, such as petechiae with vitamin C deficiency and rickets with vitamin D deficiency, represent accurate clinical associations.

56. (A) 2, 1, 4, 3
The World Health Organization classifies the clinical signs of xerophthalmia based on a strict physiological progression. The sequence begins with night blindness, followed by the appearance of foamy Bitot's spots on the conjunctiva. If the deficiency continues, the condition progresses to corneal xerosis, and ultimately culminates in keratomalacia, which involves severe liquefaction and ulceration of the cornea.

57. (D) Subjective misclassification of non-nutritional physical signs as deficiencies.
Observer bias in clinical surveys represents a significant source of error. This bias occurs when different investigators subjectively misinterpret non-nutritional physical signs as nutritional deficiencies due to personal preconceptions or inadequate training. Consequently, this variation can lead to the overestimation or underestimation of nutritional deficiencies in the population, compromising the validity of survey findings.

58. (A) Pitting edema - Kwashiorkor
Pitting edema is a defining clinical hallmark of kwashiorkor, resulting from severe hypoalbuminemia that causes fluid accumulation in the tissues. Other clinical signs must be paired correctly with their specific causative nutrient deficiencies. Spongy bleeding gums indicate vitamin C deficiency, an enlarged thyroid gland is caused by iodine deficiency, and pallor indicates a lack of dietary iron.

59. (B) Clinical surveys can detect sub-clinical and marginal deficiencies before any physical changes occur.
Clinical surveys have distinct limitations, particularly their inability to detect subclinical or marginal nutritional deficiencies before physical signs appear. Physical symptoms only manifest after biochemical depletion has occurred. Furthermore, many clinical signs are non-specific and can be caused by environmental factors, and significant inter-observer variation remains a major challenge during field examinations.

60. (B) Biochemical tests detect early subclinical deficiencies before physical symptoms manifest.
Combining clinical examinations with biochemical assessments provides a comprehensive view of population nutritional status. Clinical examinations identify visible, advanced signs of malnutrition, whereas biochemical tests detect early, subclinical deficiencies before physical symptoms manifest. This integrated approach allows public health officials to identify individuals at risk and implement preventive interventions before irreversible physiological damage occurs.

61. (A) Serum ferritin
Serum ferritin is the most widely accepted and sensitive biochemical marker for assessing iron status in populations. It directly reflects intracellular iron stores, making it highly effective for detecting early iron deficiency before anemia develops. When iron stores are depleted, serum ferritin concentrations fall, providing a reliable diagnostic indicator of subclinical iron deficiency.

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62. (A) P-IV, Q-II, R-I, S-III
Biochemical markers are highly specific to individual nutrients. Urinary iodine excretion is the standard indicator for iodine status, while serum retinol levels reflect vitamin A reserves. Hemoglobin concentration is measured to assess iron status and detect anemia. Finally, serum twenty-five-hydroxy vitamin D is the recommended biomarker for evaluating overall vitamin D status in individuals.

63. (C) Statement I is correct and Statement II is incorrect.
Mid-upper arm circumference is a simple and reliable screening tool for acute malnutrition in children. A measurement below eleven point five centimeters in children aged six to fifty-nine months indicates severe acute malnutrition. Because this measurement is simple to perform and requires no complex mathematical calculations, it is easily conducted by community health workers using color-coded tapes.

64. (C) The measurement of physical dimensions and gross composition of the body.
Anthropometric measurements are defined as the systematic physical measurements of the human

by combining physical anthropometry with blood and urine biomarkers. Unlike earlier surveys that relied solely on physical measurements, this survey assessed subclinical micronutrient deficiencies, such as vitamin D and zinc status, alongside metabolic risk factors for chronic diseases in children and adolescents nationwide.

46. (C) Children and adolescents aged 0 to 19
The Comprehensive National Nutrition Survey was specifically designed to address critical data gaps in pediatric and adolescent health. It targeted children and adolescents aged zero to nineteen years, collecting national-level data on this group. This survey represented the first time this age bracket underwent extensive biochemical profiling alongside traditional anthropometric assessments on a national scale.

47. (A) P-III, Q-I, R-IV, S-II
Clinical signs provide immediate, visible clues to specific nutrient deficiencies during physical examinations. Bitot's spots on the conjunctiva are characteristic of vitamin A deficiency. Spoon-shaped nails, known as koilonychia, indicate severe iron deficiency. Spongy, bleeding gums are classic signs of scurvy caused by vitamin C deficiency, whereas thyroid gland enlargement, or goiter, results from iodine deficiency.

48. (C) Statement I is correct and Statement II is incorrect.
Clinical examination is highly practical for rapid, cost-effective assessments of nutritional status in large populations because it requires no laboratory equipment. However, clinical signs are not entirely specific. A single physical sign, such as dermatitis or hair changes, can result from multiple distinct nutrient deficiencies or environmental factors, requiring biochemical validation for definitive diagnosis.

49. (B) The physical examination of superficial tissues like skin, eyes, and hair to detect deficiency signs
A clinical survey in nutritional assessment is defined as the systematic physical examination of superficial tissues of the body, particularly the skin, eyes, hair, and mucous membranes. This non-invasive method seeks to identify visible, diagnostic signs of nutrient deficiencies. It serves as a rapid, practical field screening tool to evaluate the nutritional status of large communities.

50. (A) I, II, and IV only
The Comprehensive National Nutrition Survey was designed with clear public health objectives. It aimed to measure the prevalence of micronutrient deficiencies and evaluate markers for non-communicable diseases in young populations. Additionally, it sought to establish a robust national database of anthropometric and biochemical indicators. It did not, however, assess the commercial market share of fortified foods.

51. (A) Flag sign (alternating bands of light and dark hair) is frequently observed in Kwashiorkor.
Protein-energy malnutrition presents with distinct clinical signs depending on the type of deficiency. Kwashiorkor, which is caused by severe protein deficiency, often features the flag sign, characterized by alternating bands of light and dark hair. It also presents with edema and moon face. Conversely, marasmus is characterized by severe wasting of muscle and subcutaneous fat.

52. (C) Vitamin B2 (Riboflavin)
Clinical signs such as angular stomatitis, cheilosis, and a magenta-colored tongue are classic diagnostic indicators of riboflavin deficiency. Riboflavin, also known as vitamin B2, is essential for maintaining mucous membrane integrity. When dietary intake is inadequate, lesions develop at the corners of the mouth and on the lips, accompanied by characteristic changes in tongue color.

53. (A) Both A and R are true and R is the correct explanation of A.
Clinical signs of nutritional deficiencies appear only in the advanced stages of malnutrition. When nutrient intake is insufficient, the body initially depletes its cellular and tissue stores. This depletion leads to biochemical changes and metabolic dysfunction. Only after these internal systems are compromised do visible physical and morphological changes manifest on the body surface.

54. (D) Casal's necklace
Vitamin A deficiency is clinically characterized by progressive ocular signs, starting with night blindness and conjunctival xerosis, followed by Bitot's spots, corneal xerosis, and ultimately keratomalacia. Conversely, Casal's necklace is a distinct dermatological sign of pellagra. This hyperpigmented rash develops around the neck in individuals suffering from severe niacin deficiency, particularly after sun exposure.

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survey using the weighment method, where trained investigators physically weighed the raw food ingredients before cooking. This rigorous approach provided highly reliable quantitative data on actual household dietary patterns and nutrient distribution.

37. (A) The population is experiencing recent, acute nutritional deficit or disease outbreak.
In nutritional epidemiology, wasting indicates low weight-for-height, which reflects recent and severe weight loss. This condition is typically caused by acute, short-term starvation, sudden food insecurity, or severe infectious diseases. In contrast, stunting is an indicator of chronic, long-term undernutrition. Therefore, high wasting accompanied by low stunting points specifically to a recent, acute crisis.

38. (A) Both A and R are true and R is the correct explanation of A.
The Comprehensive National Nutrition Survey was a landmark initiative in India because it moved beyond traditional physical anthropometry. It was the first national survey to collect blood, urine, and stool samples from a large representative sample of children and adolescents. These biochemical assessments provided unprecedented data on subclinical micronutrient deficiencies and early risk markers for non-communicable diseases.

39. (B) Body fat percentage via bioelectrical impedance
The National Family Health Survey routinely collects basic anthropometric and health data to assess childhood malnutrition. This includes measuring weight using digital scales, height or length with stadiometers, and hemoglobin levels to determine anemia status. However, advanced body composition parameters, such as measuring body fat percentage using bioelectrical impedance analysis, are not included in these standard field protocols.

40. (C) Underweight - BMI-for-age Z-score below -4 SD
Underweight in children under five is defined by a weight-for-age Z-score below minus two standard deviations, representing a composite indicator of acute and chronic malnutrition. It is not defined using a BMI-for-age cutoff of minus four standard deviations. In contrast, wasting and stunting are correctly defined using height-for-age and weight-for-height Z-score cutoffs of minus two standard deviations.

41. (A) 4, 1, 2, 3
Chronological timelines of major Indian health surveys help trace the development of nutritional data. The final rural report of the National Nutrition Monitoring Bureau was released first. This was followed by the fourth National Family Health Survey, the Comprehensive National Nutrition Survey, and subsequently, the release of the fifth National Family Health Survey data.

42. (A) Fetal development complications and higher rates of maternal mortality
High rates of maternal anemia, as consistently highlighted in national surveys, have severe clinical consequences. Anemia during pregnancy compromises oxygen delivery to both maternal tissues and the growing fetus. This deficiency directly leads to poor fetal development, low birth weight, and preterm births, while significantly increasing the maternal risk of postpartum hemorrhage and mortality during childbirth.

43. (B) CNNS - School-age children, adolescents, and pre-schoolers
National surveys are designed to target specific populations. The Comprehensive National Nutrition Survey specifically focused on pre-schoolers, school-age children, and adolescents, collecting unique biochemical and anthropometric data. In contrast, the National Nutrition Monitoring Bureau focused on rural and tribal households, while the National Family Health Survey provides broad demographic, maternal, and child health indicators.

44. (B) It is still the primary active agency releasing annual dietary data as of 2024.
The National Nutrition Monitoring Bureau, established in 1972, played a crucial role in collecting rural and tribal dietary data across ten Indian states. This data guided several national nutrition policies and supplementary feeding initiatives. However, the bureau is no longer active, and it does not serve as the primary agency releasing annual dietary data as of 2024.

45. (A) It collected both anthropometric and biochemical biomarkers in children and adolescents.
The Comprehensive National Nutrition Survey added unique value to India's health databases

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body's dimensions and gross composition. These measurements typically include height, weight, skinfold thickness, and body circumferences. Because they reflect changes in nutritional intake and physical growth, these quantitative parameters are widely used in public health to evaluate overall health, development, and nutritional status.

65. (A) I and III only
Skinfold thickness measurements are used to estimate subcutaneous fat reserves at specific anatomical sites on the body. Because subcutaneous fat is proportional to total body fat, these measurements are used to indirectly estimate overall body fat percentage. However, they cannot directly measure total muscle mass or determine bone mineral density, which require more advanced imaging technologies.

66. (D) Its long half-life makes it an indicator of chronic rather than acute protein status.
Serum albumin is a visceral protein with a relatively long biological half-life of approximately twenty days. Consequently, its concentration changes slowly, making it an indicator of chronic rather than acute protein depletion. Because of this slow response and susceptibility to non-nutritional factors like inflammation and hydration status, it is less sensitive for monitoring rapid, acute nutritional changes.

67. (C) Overweight
Body Mass Index is calculated by dividing weight in kilograms by the square of height in meters. For an individual weighing seventy-five kilograms with a height of one point seven meters, the calculated value is approximately twenty-five point nine. According to international standards, a value within the range of twenty-five to twenty-nine point nine falls into the overweight category.

68. (A) Both A and R are true and R is the correct explanation of A.
Urinary iodine concentration in spot urine samples is the recommended biochemical indicator for assessing iodine status in populations. This is because the kidneys excrete over ninety percent of dietary iodine, making urinary levels a sensitive reflection of recent dietary intake. Thus, median concentrations from spot samples provide a reliable, non-invasive method for monitoring population-level iodine adequacy.

69. (A) Spectrophotometer
Anthropometric assessments require specific physical tools, including infantometers for measuring recumbent length, stadiometers for standing height, and skinfold calipers for fat reserves. In contrast, a spectrophotometer is a laboratory instrument used to measure light absorption in biochemical analyses. It is not an anthropometric tool and is never used to measure physical body dimensions in field surveys.

70. (D) BMI-for-age - Microcephaly
Anthropometric indices are used to identify specific nutritional and growth conditions. Height-for-age indicates chronic malnutrition, weight-for-height reflects acute wasting, and head circumference monitors infant brain development. However, body mass index-for-age is used to assess thinness, overweight, and obesity in children and adolescents. It is not used to diagnose microcephaly, which requires head circumference measurements.

71. (B) Red zone indicates Severe Acute Malnutrition.
Mid-upper arm circumference tapes are color-coded to simplify the screening of acute malnutrition in community settings. The green zone represents normal nutritional status, the yellow zone indicates moderate acute malnutrition, and the red zone signifies severe acute malnutrition. Health workers use these distinct color bands to quickly identify children who require urgent therapeutic feeding and medical care.

72. (C) It causes hemoconcentration, falsely elevating levels and masking anemia.
Severe dehydration reduces plasma volume, leading to hemoconcentration. This physiological shift increases the concentration of red blood cells and hemoglobin in the remaining blood volume. Consequently, biochemical assessments of hemoglobin will yield falsely elevated levels. This artificial elevation can mask underlying anemia, leading to incorrect clinical interpretations of an individual's actual iron status.

73. (D) Recumbent length (under 2 years) - Infantometer
Each anthropometric measurement requires a specific, calibrated instrument to ensure accuracy. Recumbent length in infants under two years of age is measured using an infantometer, which accommodates their lying position. Conversely, standing height is measured with a stadiometer,

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to estimate nutrient intakes. Therefore, only the structured use of standardized portions in semi-quantitative questionnaires allows for the quantitative estimation of overall nutrient consumption.

19. (A) All food and beverage items are weighed and recorded at the exact time of consumption.
The weighed food record is a prospective dietary assessment method where all food and beverage items are physically weighed using accurate scales immediately before consumption. The respondent or investigator must also weigh any plate waste after eating. This direct measurement eliminates memory-related errors, making it one of the most precise methods for quantifying actual individual food intake.

20. (A) I and II only
The weighed food record method provides superior accuracy in determining precise portion sizes because all food is weighed directly before consumption, eliminating recall bias. However, this method requires high literacy levels and strong motivation, as respondents must document every meal meticulously. Consequently, it carries a high respondent burden and is generally unsuitable for illiterate or unmotivated populations.

21. (A) The food list must be specific to study objectives and culturally appropriate.
Designing an effective food frequency questionnaire requires a carefully curated food list that is specific to the research objectives and culturally relevant to the study population. Including every food item in the market is impractical and increases respondent fatigue. Instead, the list must focus on key foods that contribute most to the intake of the nutrients under investigation.

22. (D) Food Frequency Questionnaire
In large-scale epidemiological studies involving tens of thousands of participants, feasibility and cost are major considerations. The food frequency questionnaire is highly practical for such research because it is inexpensive, easy to administer, and can be self-completed. Furthermore, it effectively captures long-term habitual intake patterns, which is critical for identifying links between chronic diseases and dietary factors.

23. (A) Both A and R are true and R is the correct explanation of A.
Food frequency questionnaires are the primary dietary assessment tool in large-scale chronic disease epidemiology. Their widespread use is justified because they are cost-effective to administer to large cohorts and focus on capturing long-term habitual diet rather than short-term intake. Since chronic diseases develop over decades, assessing usual long-term dietary patterns is crucial for establishing reliable diet-disease relationships.

24. (C) Weighed food record
Retrospective dietary assessment methods, such as twenty-four-hour recalls, food frequency questionnaires, and dietary histories, rely fundamentally on the respondent's memory of past intake. In contrast, the weighed food record is a prospective method. It requires individuals to weigh and record foods in real-time, thereby eliminating reliance on cognitive recall and minimizing memory-related reporting errors.

25. (D) Dietary history - Prospective
Dietary assessment methods are classified as prospective or retrospective. Prospective methods, such as weighed records, document food intake in real-time as it is consumed. Retrospective methods, including twenty-four-hour recalls, food frequency questionnaires, and dietary histories, evaluate past consumption. Thus, classifying dietary history as a prospective method is incorrect because it relies on recalling habitual past diet.

26. (A) 2, 1, 3, 4
The weighed food record method follows a strict chronological sequence to ensure precise quantification. The process begins with weighing raw ingredients before preparation. Next, the cooked portion served on the plate is weighed. After consumption, any remaining plate waste is weighed. Finally, the net intake is calculated and recorded in the logbook to determine exact food consumption.

27. (B) Respondents may alter their usual diet to simplify the recording process.
The weighed food record places a high burden on respondents, as they must weigh and log everything they consume. To simplify this demanding process, individuals often alter their eating habits, such as consuming simpler meals or

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83. (A) Both A and R are true and R is the correct explanation of A.
The adoption of the 2006 World Health Organization growth standards led to an apparent increase in diagnosed severe acute malnutrition. This shift occurred because the standards were based on healthy, breastfed infants, who grow more rapidly in the first six months compared to formula-fed infants. This established a more stringent reference curve, making the classification of malnutrition more precise.

84. (C) Mid-upper arm circumference-for-height
World Health Organization child growth charts plot several standardized indicators to monitor physical development, including weight-for-age, height-or-length-for-age, and body mass index-for-age. While mid-upper arm circumference is a valuable standalone screening tool for acute malnutrition, it is not plotted against height on standard growth charts, making that specific ratio an incorrect growth monitoring indicator.

85. (D) -3 Z-score = 25th percentile
Z-scores and percentiles are mathematically related in standard normal distributions. A Z-score of zero corresponds to the fiftieth percentile, while minus two standard deviations corresponds to approximately the second percentile, and plus two standard deviations represents the ninety-eight percentile. However, a Z-score of minus three represents the extreme lower tail, approximately the zero point one percentile, not the twenty-fifth.

86. (D) Refer the infant for clinical assessment because growth faltering has occurred.
A horizontal or flat line on a child's weight-for-age growth chart indicates a lack of weight gain over time, known as growth faltering. Because infants should gain weight continuously, a flat curve over three consecutive months is a warning sign of underlying illness or nutritional deficiency, requiring immediate referral for clinical assessment and targeted intervention.

87. (B) It indicates growth faltering, often due to inadequate intake or recurrent infections.
A horizontal growth curve on a child's weight-for-age chart indicates that the child has not gained weight over that period. This lack of growth represents growth faltering, which is typically caused by inadequate dietary intake, poor feeding practices, or recurrent infections. Detecting this trend early allows healthcare workers to intervene before severe clinical malnutrition develops.

88. (C) Shakir tape (MUAC) - Rapid screening of acute malnutrition
Different tools are designed for specific settings and applications in nutritional screening. Shakir tape is a simple, color-coded mid-upper arm circumference measuring tool used for the rapid screening of acute malnutrition in community settings. In contrast, the Road to Health card is a child growth tracking chart, while Salter scales are used for weighing infants.

89. (D) It is solely a diagnostic tool and has no educational value for the mother.
Growth monitoring is a preventive health practice that involves regular physical measurements of a child. Plotting these measurements on a chart makes growth visible to health workers and parents, enabling the early detection of growth faltering. Furthermore, this process serves as an important educational tool to counsel mothers regarding infant feeding, hygiene, and health promotion.

90. (A) To monitor child growth, track immunization, and provide maternal health education
The Road to Health growth chart is a versatile tool used in primary health care and child development programs. Its primary utility is to monitor a child's physical growth over time by plotting weight measurements. Additionally, it serves to track essential immunization schedules and provides a visual aid to educate mothers regarding nutrition, hygiene, and childcare.

91. (B) PM POSHAN (Pradhan Mantri Poshan Shakti Nirman)
The school meal program in India, historically known as the Mid-Day Meal Scheme, was recently revamped and renamed. Its current official name is PM POSHAN, which stands for Pradhan Mantri Poshan Shakti Nirman. This national initiative aims to improve the nutritional status of school-age children while simultaneously encouraging school enrollment, attendance, and social integration.

92. (A) P-II, Q-IV, R-I, S-III
The PM POSHAN scheme mandates specific nutritional standards for school meals based on grade levels. For primary school children in classes one to five, the meal must provide four

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hundred and fifty calories and twelve grams of protein. For upper primary children in classes six to eight, the standard is seven hundred calories and twenty grams of protein.

93. (D) Statement I is incorrect and Statement II is correct.
The Integrated Child Development Services is a Centrally Sponsored Scheme, meaning it is funded jointly by the Central and State governments, not solely by the States. The program delivers a comprehensive package of six services, with supplementary nutrition and non-formal pre-school education serving as core components administered through local Anganwadi centers across India.

94. (B) 800 calories and 20-25 grams of protein per day
Under the Integrated Child Development Services scheme, the Supplementary Nutrition Programme mandates specific nutritional norms for different beneficiary groups. For severely malnourished children aged six to seventy-two months, the daily supplement must provide eight hundred calories and twenty to twenty-five grams of protein. This higher nutritional threshold is designed to support rapid physical recovery.

95. (B) I, II, and IV only
The Integrated Child Development Services scheme delivers a standard package of six core services designed for child development. This package includes supplementary nutrition, immunization, health check-ups, referral services, non-formal pre-school education, and nutrition and health education. It does not include tertiary surgical care, which is provided through specialized medical institutions rather than local Anganwadi centers.

96. (C) The Food Corporation of India provides subsidized food grains under the National Food Security Act.
The food grain allocation for the PM POSHAN scheme is managed through a centralized national mechanism. Under the provisions of the National Food Security Act, the Food Corporation of India allocates subsidized food grains to State governments for distribution to schools. This system ensures a steady, subsidized supply of staples to maintain the program's operations.

97. (B) Meeting the primary student nutritional norm of 450 Kcal and 12g protein
The standardized recipe for primary school meals under the school lunch program is formulated to meet specific nutritional guidelines. By using designated quantities of food grains, pulses, vegetables, and oil, the recipe is engineered to provide approximately four hundred and fifty calories and twelve grams of protein, fulfilling the mandated nutritional requirements for younger students.

98. (A) Both A and R are true and R is the correct explanation of A.
The school meal scheme is designed to address both educational and nutritional deficits in India. Providing a hot, nutritious meal at school attracts children from disadvantaged backgrounds, increasing enrollment and regular attendance. Furthermore, by alleviating classroom hunger, the meal enhances students' concentration and learning capacity, showing how nutritional support directly facilitates educational achievement.

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99. (A) Geriatric population above 65 years
The Integrated Child Development Services program targets specific vulnerable groups to ensure early childhood development and maternal health. Its primary beneficiaries include children under six years of age, pregnant women, and lactating mothers. The program does not cover the geriatric population, as older adults are supported through separate social welfare and healthcare schemes.

100. (C) Medical Officer - Daily cooking of the hot meal
In the Anganwadi system, services are delivered by designated personnel according to established guidelines. The Anganwadi worker provides pre-school education and distributes supplementary nutrition, while health workers like the auxiliary nurse midwife and medical officer conduct immunizations. Assigning daily cooking duties to a medical officer is incorrect, as meals are prepared by helper staff.

101. (A) Collect cooked food, raw ingredient, and water samples for clinical analysis.
In the event of a food poisoning outbreak, investigating officers must follow standard food safety protocols. Competency-based guidelines require the collection of cooked food, raw ingredient, and water samples from the facility

for clinical and microbiological analysis. This immediate step is critical to identify the causative contaminant and prevent further transmission of foodborne illness.

102. (D) Increased school enrollment and attendance, especially among marginalized groups.
Providing a hot cooked meal daily in schools has a documented positive impact on the educational sector. By alleviating household food insecurity, the program serves as an incentive for parents to send their children to school. This has significantly increased school enrollment and regular attendance, particularly among girls and children from marginalized socio-economic backgrounds.

103. (B) Normal children (6 months to 6 years) - 500 Kcal and 12-15g protein
The Supplementary Nutrition Programme under the Integrated Child Development Services prescribes specific nutritional norms for target groups. For normal children aged six months to six years, the daily supplement must provide five hundred calories and twelve to fifteen grams of protein. These quantities are designed to bridge the gap between home diets and actual nutritional requirements.

104. (C) It mandates that the meal be served only in the form of dry rations on standard school days.
The guidelines for the PM POSHAN scheme focus on delivering fresh, hot cooked meals to children on school days, rather than distributing dry rations. The program encourages the development of school nutrition gardens and the use of fortified foods. It also includes community initiatives like Tithi Bhojan to foster local participation and improve meal quality.

105. (D) Integrating health, nutrition, and early education services at the Anganwadi center.
The core strategy of the Integrated Child Development Services program is to deliver a package of mutually supportive interventions. By integrating health check-ups, immunizations, referral services, supplementary nutrition, and non-formal pre-school education, the program addresses the physical, cognitive, and social development of children in a coordinated manner at local Anganwadi centers.

106. (B) 400-800 population
The establishment of Anganwadi centers under the Integrated Child Development Services scheme is based on population norms. In normal rural and urban areas, one center is typically established for a population of four hundred to eight hundred people. This population-based mapping ensures that essential maternal and child health services remain physically accessible to the community.

107. (A) P-II, Q-IV, R-III, S-I
National nutrition programs implement specific interventions to target key deficiencies. The National Iodine Deficiency Disorders Control Programme focuses on universal salt iodization. The National Nutritional Anaemia Prophylaxis Programme provides regular iron and folic acid supplements, while the Weekly Iron and Folic Acid Supplementation scheme targets adolescents. The Vitamin A Prophylaxis Programme administers biannual high-dose vitamin A.

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108. (A) Both Statement I and Statement II are correct.
The National Iodine Deficiency Disorders Control Programme establishes statutory standards for iodine levels in edible salt. To account for iodine loss during transit and storage, the salt must contain at least thirty parts per million of iodine at the manufacturing level. This ensures that a minimum of fifteen parts per million remains available at the consumer level.

109. (A) When the prevalence of goitre in school-age children is 5% or more
The endemicity of iodine deficiency disorders in a geographic area is defined using standardized epidemiological criteria. According to global and national standards, an area is classified as endemic for goiter when the prevalence of thyroid enlargement among school-age children is five percent or more. This cutoff indicates a significant public health problem requiring universal salt iodization.

110. (A) I, II, and III only
The National Nutritional Anaemia Prophylaxis Programme implements specific protocols for pregnant women to prevent anemia. This includes providing daily supplements containing one hundred milligrams of elemental iron and five hundred micrograms of folic acid. Beneficiaries are advised to consume these tablets for at least

shows how a simple, universal fortification strategy can reduce iodine deficiency disorders at the population level.

149. (A) It is a regulatory enforcement wing that conducts raids and arrests non-compliant millers. The Food Fortification Resource Centre is a technical and advocacy hub established under the Food Safety and Standards Authority of India. It does not operate as an enforcement wing to conduct raids or make arrests. Instead, the center provides technical assistance, capacity building, and resources to help food manufacturers and government programs adopt food fortification.

150. (D) Poverty, cultural dietary taboos, poor sanitation, and inequitable resource distribution. Despite multiple public health initiatives, completely eradicating malnutrition in India remains a challenge due to its complex, multi-dimensional causes. These underlying factors include poverty, cultural food taboos, poor sanitation, lack of clean drinking water, and inequitable food distribution. Addressing these social determinants of health is essential alongside direct nutritional interventions to achieve lasting progress.

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120. (C) Median Urinary Iodine Concentration (UIC)
The median urinary iodine concentration is the globally accepted biomarker for assessing and monitoring the iodine status of populations. Because the kidneys excrete the majority of ingested iodine, urinary levels serve as a sensitive indicator of recent dietary intake. This makes spot urine sampling a practical, reliable tool for evaluating the efficacy of salt iodization.

121. (D) Adolescent girls and boys (10-19 years)
The Weekly Iron and Folic Acid Supplementation programme is designed to target a specific demographic group. It focuses on adolescent girls and boys aged ten to nineteen years, enrolled in government schools or out of school. This intervention addresses the high prevalence of anemia in this age group during a period of rapid growth and development.

122. (A) P-II, Q-III, R-IV, S-I
The National Food Security Mission implements sub-missions to enhance the production of specific crops. The rice component focuses on increasing paddy yields, while the pulse component targets legumes like chickpea and lentil. The coarse cereals component covers crops like maize and barley, and the nutri-cereals sub-mission promotes nutrient-rich millets like sorghum and pearl millet.

123. (A) Both Statement I and Statement II are correct.
The Weekly Iron and Folic Acid Supplementation program combines multiple interventions to address adolescent anemia. This protocol includes a weekly blue tablet containing one hundred milligrams of elemental iron and five hundred micrograms of folic acid. Additionally, the program incorporates biannual deworming using Albendazole to control helminthic infections, which can contribute to blood loss and anemia.

124. (B) Physical and economic access to safe and nutritious food to meet dietary needs.
Food security is defined as a multi-dimensional concept that exists when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food. This access must meet their dietary needs and food preferences for an active, healthy life, moving beyond simple agricultural production to encompass availability, access, and utilization.

125. (B) I, II, and IV only
The SABLA scheme is designed to empower adolescent girls aged eleven to eighteen through multi-sectoral interventions. Its objectives include improving health and nutritional status, upgrading home-based and life skills, and raising awareness about reproductive health and family welfare. It does not replace the school curriculum, but rather supports girls who are out of school.

126. (C) Biannual administration of Albendazole is conducted to control helminthic infestation.
The Weekly Iron and Folic Acid Supplementation program includes a deworming component to address hookworm and other helminthic infestations, which cause intestinal blood loss and contribute to anemia. The guidelines mandate the biannual administration of Albendazole to school-age children and adolescents. This regular deworming is essential to maximize the absorption and efficacy of the iron supplements.

127. (D) Advise students to take the tablet after a meal, typically after the Mid-Day Meal.
Iron supplements can cause mild gastrointestinal side effects, such as nausea and abdominal discomfort, when taken on an empty stomach. To minimize these adverse effects and improve compliance in school programs, students should be advised to consume the tablet after a meal. Administering the supplement after the school lunch helps reduce gastric irritation.

128. (A) Both A and R are true and R is the correct explanation of A.
The SABLA scheme focuses on out-of-school adolescent girls to address their heightened vulnerability. This group is at risk for early marriage, poor nutrition, and a lack of reproductive health awareness. Providing these girls with nutritional supplements, life skills education, and vocational training helps protect their health and supports their transition into adulthood.

129. (B) Sugarcane
The National Food Security Mission was launched in 2007 with a clear focus on enhancing food grain production. Its primary targets were rice, wheat, and pulses, which are essential staples for food security in India. The mission did not include commercial cash crops like sugarcane, as its funding and strategies were designed for staple grains.

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130. (D) Cash Transfer Component - A monthly stipend of Rs. 5000 directly to the beneficiary
The SABLA scheme focuses on delivering physical services, such as supplementary nutrition, health checkups, and life skills training, rather than direct cash transfers. The program provides daily nutrition containing six hundred calories and eighteen to twenty grams of protein for three hundred days. It does not include a monthly cash stipend of five thousand rupees.

131. (A) A misconception that the tablet is meant only for girls or causes infertility.
A high dropout rate in school iron supplementation programs among boys is often linked to social misconceptions. Common rumors may suggest that the blue tablet is only for girls or that it negatively affects male fertility. Addressing these misunderstandings through targeted health education and counseling is essential to improve program acceptance and compliance among male students.

132. (C) Increased crop productivity and production to enhance national food security.
The adoption of high-yielding crop varieties and improved agricultural practices under the National Food Security Mission is designed to increase crop yields. By enhancing productivity at the farm level, these interventions increase the overall supply of staple food grains. This increased production helps stabilize food availability and supports national food security goals.

133. (A) PM POSHAN (Mid-Day Meal) - Ministry of Education
National nutrition and health programs are administered by specific nodal ministries at the Central level. The PM POSHAN scheme, formerly the Mid-Day Meal program, is managed by the Ministry of Education. In contrast, the Integrated Child Development Services is under the Ministry of Women and Child Development, and the Food Security Mission is under the Ministry of Agriculture.

134. (D) It provides absolutely no financial assistance or subsidies to farmers for purchasing seeds or machinery.
The National Food Security Mission is a Centrally Sponsored Scheme designed to increase the production of rice, wheat, and pulses. It focuses on improving soil fertility and productivity. To support these goals, the mission provides financial assistance and subsidies to farmers for purchasing quality seeds, organic fertilizers, and modern farm machinery, making that exclusion statement incorrect.

135. (B) To achieve holistic empowerment as physical health and vocational skills are interdependent.
The integration of nutrition provision with life skills and vocational training under the SABLA scheme is designed to achieve holistic development. Physical health and economic independence are closely linked; nutritional support addresses immediate physical needs, while life skills and vocational training empower adolescent girls to seek future livelihood opportunities, breaking the cycle of poverty and malnutrition.

136. (C) The food is fortified with essential micronutrients.
The +F logo, mandated by the Food Safety and Standards Authority of India, is a diagnostic mark used on food packaging. This logo signifies that the food product has been fortified with essential micronutrients according to national standards. It helps consumers identify fortified staple foods, such as milk, oil, and rice, that can help address micronutrient deficiencies.

137. (A) P-II, Q-III, R-I, S-IV
The Food Safety and Standards Authority of India has established standards for fortifying staple foods with specific micronutrients. Edible oil and milk are fortified with vitamins A and D, while wheat flour is enriched with iron, folic acid, and vitamin B12. Additionally, double fortified salt contains both iodine and iron to target multiple deficiencies simultaneously.

138. (A) Both Statement I and Statement II are correct.
The Food Fortification Resource Centre was established by the Food Safety and Standards Authority of India in collaboration with Tata Trusts and other partners. It serves as a resource hub to provide technical support, capacity building, and advocacy. This center helps food manufacturers adopt fortification and assists government departments in implementing fortification in safety net programs.

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139. (B) Enhancing crop nutritional quality via breeding or biotechnology during the plant growth phase.
Biofortification differs from conventional food fortification in its timing and method. While conventional fortification adds nutrients during post-harvest processing, biofortification increases the nutritional value of crops during the plant growth phase. This is achieved through plant breeding, agronomic practices, or biotechnology, resulting in crops that are naturally rich in vitamins and minerals.

140. (A) I and III only
The Food Safety and Standards Authority of India promotes food fortification through safety net programs. The agency encourages the use of fortified oil, milk, and salt in school meals and child development schemes, and promotes fortified rice in the public distribution system. It does not provide direct financial grants to schools or restrict the use of fortified foods.

141. (A) Milk is fortified with Vitamin A (270-330 μg RE/L) and Vitamin D (5-7.5 μg/L).
Under national regulations, liquid milk can be fortified with fat-soluble vitamins to help address deficiencies. The Food Safety and Standards Authority of India mandates that fortified milk must contain specific levels of vitamin A and vitamin D. This process is applicable to multiple milk varieties, helping to restore nutrients lost during processing and fat removal.

142. (C) Encapsulated Ferrous Fumarate
When formulating double fortified salt, using the correct iron compound is critical to prevent stability issues. Raw iron compounds can react with iodine and moisture, causing discoloration and iodine loss. To prevent these chemical reactions during storage, manufacturers use encapsulated ferrous fumarate. This encapsulation creates a barrier, keeping the iron and iodine stable and maintaining salt quality.

143. (A) Both A and R are true and R is the correct explanation of A.
Food fortification is promoted as a complementary strategy to address micronutrient malnutrition. This approach is cost-effective and does not require changes in dietary habits, as it delivers nutrients through widely consumed staple foods. While it helps reduce deficiencies across populations, it is designed to complement, rather than replace, efforts to promote dietary diversity and long-term food security.

144. (C) Refined Sugar
The Food Safety and Standards Authority of India has identified five staple foods for large-scale fortification to address common nutrient deficiencies. These staples include rice, wheat flour, edible oil, milk, and salt, which are consumed daily across diverse socio-economic groups. Refined sugar is not included in this program, as it is not considered a healthy vehicle.

145. (B) Calcium carbonate - Bottled mineral water
Food fortification standards pair specific chemical compounds with target foods. Edible salt is fortified with potassium iodate, edible oil with retinyl palmitate, and rice kernels with ferric pyrophosphate. However, calcium carbonate is not used to fortify bottled mineral water under these standards, as bottled water is not a target vehicle for large-scale public health fortification.

146. (D) Explain that iron fortificants may cause slight discoloration with moisture but remain safe.
Fortified rice kernels contain iron compounds, such as ferric pyrophosphate, which can sometimes react with water and cause slight discoloration during washing or cooking. Food safety officers should explain to consumers that this minor color change is a safe chemical reaction that does not indicate adulteration, assuring them that the rice remains safe and nutritious for consumption.

147. (A) Overlapping target groups, fragmented resources, and suboptimal impacts on nutrition.
Poor coordination among the ministries of health, education, and child development can limit the effectiveness of nutrition programs. When departments operate in isolation, it can lead to overlapping services, fragmented resources, and administrative inefficiencies. This lack of integration reduces the overall impact of public health interventions, highlighting the need for coordinated, multi-sectoral action.

148. (C) Near-universal coverage of iodized salt in over 70% of households - NIDDCP
National nutrition programs have achieved varying levels of success. A notable achievement of the National Iodine Deficiency Disorders Control Programme is reaching near-universal coverage of iodized salt, with over seventy percent of households in India using it. This progress

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(C) P-IV, Q-I, R-II, S-III
(D) P-II, Q-IV, R-III, S-I

7. Given below are two statements:
Statement I: Replacing dietary saturated fats with refined carbohydrates significantly reduces the risk of cardiovascular events.
Statement II: Refined carbohydrates can induce hypertriglyceridemia and decrease HDL cholesterol levels.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

8. Arrange the following pathophysiological steps of diet-induced atherosclerosis in the correct sequence:
I. Oxidation of LDL particles in the subendothelial space
II. Accumulation of LDL cholesterol in the arterial intima
III. Formation of foam cells and fatty streaks
IV. Macrophage recruitment via endothelial adhesion molecules
Which of the following represents the correct sequence?
(A) I, II, III, IV
(B) II, I, IV, III
(C) II, IV, I, III
(D) IV, II, I, III

9. Which of the following statements regarding preventive nutrition for cardiovascular disease is incorrect?
(A) Daily intake of plant stanols and sterols is widely recommended to lower serum LDL cholesterol levels.
(B) Replacing saturated fats with polyunsaturated fatty acids significantly reduces overall cardiovascular risk.
(C) High dietary intake of fruits and vegetables is protective due to their rich potassium and antioxidant content.
(D) Dietary cholesterol intake has a linear and highly significant impact on serum LDL levels in all individuals.

10. As a Food Safety Officer evaluating a commercial food product marketed as "Heart Healthy," which of the following nutritional profiles would legally and scientifically justify this claim?
(A) Low in saturated fat and sodium, zero trans fat, containing soluble fibre
(B) High in saturated fat and sodium, zero trans fat, containing insoluble fibre
(C) Low in polyunsaturated fat, high sodium, high cholesterol, low dietary fibre
(D) High in refined carbohydrates, zero cholesterol, high trans fat, low calcium

11. Which of the following is correctly paired regarding lipoproteins and their primary function?
(A) Chylomicrons - Transport endogenous triglycerides from the liver to peripheral tissues
(B) LDL - Major carrier of cholesterol to peripheral tissues
(C) VLDL - Transport dietary triglycerides from the intestine to the liver
(D) HDL - Deliver cholesterol from the liver to the peripheral tissues

12. The concept of dietary Glycaemic Index (GI) is critical in managing NCDs. Which intrinsic food factor does NOT lower the glycaemic index of a meal?
(A) Presence of intact botanical cell walls
(B) High ratio of amylopectin to amylose
(C) Presence of highly soluble viscous fibres
(D) Addition of dietary fats or organic acids

13. Identify the incorrect pair regarding edible oils and their predominant fatty acid composition.
(A) Mustard oil - Eicosapentaenoic acid
(B) Olive oil - Monounsaturated oleic acid
(C) Sunflower oil - Polyunsaturated linoleic acid
(D) Coconut oil - Medium-chain lauric acid

14. Which of the following is NOT considered a dietary risk factor for the development of cardiovascular disease?
(A) High dietary intake of palmitic acid
(B) Excessive consumption of added sugars
(C) High dietary intake of anthocyanins
(D) High sodium-to-potassium intake ratio

15. What is the most appropriate dietary recommendation for a patient with severe hypercholesterolemia aiming to reduce cardiovascular risk?
(A) Implement a very low-carbohydrate ketogenic diet with high saturated fat
(B) Exclusively consume medium-chain triglycerides to replace all other fats

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CHAPTER 36

Diet, Non-Communicable Diseases, Cancer and Deficiency Diseases

1. What is the most significant dietary transition contributing to the rising burden of Non-Communicable Diseases (NCDs) globally?
(A) Increased consumption of plant-based proteins and legumes
(B) Shift from complex carbohydrates to refined sugars and high-fat foods
(C) Replacement of saturated fats with monounsaturated fats
(D) Transition from processed foods to organic whole foods

2. Given below are two statements, one is labelled as Assertion (A) and the other is labelled as Reason (R):
Assertion (A): Excessive intake of trans-fatty acids increases the risk of coronary heart disease.
Reason (R): Trans-fatty acids lower low-density lipoprotein (LDL) cholesterol and elevate high-density lipoprotein (HDL) cholesterol.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

3. Which of the following statements correctly describes the role of dietary fibre in preventing cardiovascular diseases?
(A) Soluble fibre binds to bile acids in the intestine, promoting their excretion and lowering serum cholesterol.
(B) Insoluble fibre directly inhibits the absorption of sodium in the ileum.
(C) Both soluble and insoluble fibres increase the glycaemic index of meals, regulating lipid metabolism.
(D) Dietary fibre enhances the reabsorption of dietary cholesterol in the large intestine.

4. Consider the following statements regarding dietary risk factors for NCDs:
1. High intake of sodium is strongly correlated with hypertension.
2. Low potassium intake exacerbates the effects of high sodium on blood pressure.
3. Adequate intake of long-chain omega-3 fatty acids increases thrombogenesis.
4. Phytosterols competitively inhibit intestinal cholesterol absorption.

Which of the statements given above are correct?
(A) 1, 2, and 3
(B) 1, 2, and 4
(C) 2, 3, and 4
(D) 1, 3, and 4

5. A 45-year-old male presents with a lipid profile showing elevated triglycerides and low HDL levels. His diet is predominantly composed of refined carbohydrates, trans fats, and negligible fruit intake. Which specific atherogenic dyslipidemia is he most likely developing due to this diet?
(A) Predominance of small, dense LDL particles
(B) Decreased synthesis of very-low-density lipoproteins (VLDL)
(C) Increased peripheral clearance of chylomicrons
(D) Enhanced reverse cholesterol transport

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6. Match the items in List I with those in List II:
List I: (Dietary Fats)
P. Myristic acid (Saturated)
Q. Linoleic acid (Omega-6)
R. Eicosapentaenoic acid (Omega-3)
S. Elaidic acid (Trans fat)
List II: (Primary Effect on Lipid Profile)
I. Lowers serum triglycerides significantly
II. Lowers LDL but may lower HDL in large amounts
III. Raises LDL and lowers HDL
IV. Raises both total cholesterol and LDL significantly
(A) P-IV, Q-II, R-I, S-III
(B) P-III, Q-I, R-II, S-IV

one hundred days during pregnancy. The program does not combine high-dose vitamin A with iron.

111. (D) She links the health care system and the community to deliver ICDS services.
The Anganwadi worker is a community-based voluntary frontline worker under the Integrated Child Development Services. Rather than performing specialized medical or agricultural duties, she serves as a link between the healthcare system and the local community. Her role includes distributing supplementary nutrition, monitoring child growth, conducting pre-school activities, and providing basic health education.

112. (C) Store salt in sealed containers away from moisture, heat, and light.
Iodine in fortified salt is sensitive to environmental factors and can degrade over time. To maintain its stability and prevent loss of potency, iodized salt must be stored in dry, sealed containers away from direct sunlight, moisture, and high temperatures. Applying these simple storage practices ensures that the salt retains the required iodine levels for consumption.

113. (A) Both A and R are true and R is the correct explanation of A.
Double fortified salt was introduced as a public health intervention to target multiple micronutrient deficiencies simultaneously. This fortificational strategy uses common edible salt as a vehicle to deliver both iodine and iron to the population. Since salt is consumed daily across all socio-economic groups, this approach provides a cost-effective method to reduce goiter and nutritional anemia.

114. (D) Beriberi
Iodine deficiency causes a spectrum of clinical disorders due to inadequate thyroid hormone synthesis. These consequences include endemic goiter, cretinism, cognitive impairment, and neonatal hypothyroidism. Conversely, beriberi is a distinct nutritional deficiency disease caused by a lack of thiamine, also known as vitamin B1, and is unrelated to iodine status or thyroid function.

115. (A) Criminal Record Register - Tracks minor offenses committed by adolescents
Anganwadi centers maintain various registers to document health and nutrition services. These include growth monitoring registers, supplementary food stock records, and immunization logs. However, keeping a criminal record register is not a function of the Anganwadi system. This center is dedicated to maternal and child welfare, and tracking offenses falls under the jurisdiction of law enforcement.

116. (C) One IFA tablet daily from the second trimester for at least 180 days.
Under the Anaemia Mukt Bharat strategy, specific prophylactic guidelines are established for pregnant women. To prevent maternal anemia, pregnant women are advised to consume one standard iron and folic acid tablet daily, starting from the second trimester of pregnancy, for a minimum of one hundred and eighty days, helping to meet the increased physiological demands of gestation.

117. (A) The infant is born with neurological cretinism and cognitive deficits.
Severe maternal iodine deficiency during pregnancy has serious consequences for the developing fetus. Iodine is essential for the synthesis of thyroid hormones, which are critical for fetal brain development. Inadequate maternal intake during gestation can lead to irreversible congenital conditions in the newborn, such as neurological cretinism, severe cognitive deficits, and permanent growth retardation.

118. (D) Biochemical assessment tool - Estimation of urinary iodine excretion
The National Iodine Deficiency Disorders Control Programme utilizes specific tools for monitoring and evaluation. The measurement of urinary iodine excretion in spot samples serves as the primary biochemical tool to assess population-level iodine adequacy. This objective marker reflects recent dietary intake, allowing health officials to monitor the impact of universal salt iodization programs.

119. (B) Overwhelming excess of highly trained medical doctors stationed at every center.
The Anganwadi system faces several operational challenges, including inadequate infrastructure, irregular food supplies, and excessive workloads for workers. However, having an excess of medical doctors stationed at these centers is not a challenge, as Anganwadi centers are run by community workers rather than physicians, who operate from primary health centers.

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(C) Eliminate all dietary fats including essential fatty acids from the diet
(D) Increase intake of viscous soluble fibres and phytosterols from plants

16. What is the primary dietary goal in the management of Type 2 Diabetes Mellitus (T2DM)?
(A) Complete elimination of all simple and complex carbohydrates from the daily diet
(B) Significantly increasing endogenous insulin secretion through high-protein diets
(C) Achieve and maintain optimal blood glucose, lipid, and blood pressure levels
(D) Replacing all dietary fats with complex carbohydrates of high glycaemic index

17. Given below are two statements, one is labelled as Assertion (A) and the other is labelled as Reason (R):
Assertion (A): Central obesity is a major risk factor for the development of Type 2 Diabetes Mellitus.
Reason (R): Excess visceral adipose tissue secretes adipokines and free fatty acids that promote peripheral insulin resistance.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

18. Which of the following statements correctly describes the utility of dietary fibre in managing Type 2 Diabetes?
(A) Fibre increases the rate of gastric emptying, stabilizing postprandial blood sugar levels
(B) Insoluble fibre is converted to glucose in the colon, preventing nocturnal hypoglycemia spikes
(C) Fibre completely denatures digestive enzymes, preventing any dietary carbohydrate breakdown
(D) Soluble fibre delays carbohydrate absorption, reducing postprandial glucose spikes

19. Consider the following interventions for the dietary management of T2DM:
1. Monitoring carbohydrate quantity rather than just the source.
2. Using non-nutritive sweeteners to reduce overall caloric intake.
3. Consuming a high-fructose diet to utilize non-insulin-dependent pathways.
4. Distributing carbohydrate intake evenly throughout the day.

Which of the above statement(s) is/are correct?
(A) 1, 2, and 4
(B) 1, 2, and 3
(C) 2, 3, and 4
(D) 1, 3, and 4

20. A patient with Type 2 Diabetes Mellitus on sulfonylureas experiences sudden sweating, palpitations, and confusion between meals. What is the immediate dietary intervention required for this acute episode?
(A) Administration of 15-20 grams of complex starch-based carbohydrates
(B) Administration of a high-protein, low-fat snack such as boiled egg whites
(C) Administration of 15-20 grams of fast-acting simple sugars
(D) Administration of a large glass of plain water mixed with dietary soluble fibre

21. Match the items in List I with those in List II:
List I: (Nutritional Concept)
P. Glycaemic Index
Q. Glycaemic Load
R. Resistant Starch
S. Sugar Alcohols
List II: (Description)
I. Accounts for both the quality and quantity of carbohydrates
II. Starch that escapes digestion in the small intestine
III. Polyols that provide fewer calories and a lower glucose response
IV. Ranks carbohydrates based on postprandial blood glucose response
(A) P-IV, Q-I, R-II, S-III
(B) P-I, Q-IV, R-III, S-II
(C) P-IV, Q-II, R-I, S-III
(D) P-III, Q-I, R-II, S-IV

22. Given below are two statements:
Statement I: The Dietary Approaches to Stop Hypertension (DASH) diet emphasizes high intake of sodium and low intake of potassium.
Statement II: The DASH diet is rich in fruits, vegetables, and low-fat dairy products, which naturally provide high potassium, magnesium, and calcium.
(A) Both Statement I and Statement II are true.

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38. Arrange the following interventions in the standard stepped-care approach for the management of severe obesity:
I. Bariatric surgery evaluation
II. Comprehensive lifestyle modification (diet, exercise, behavioral therapy)
III. Prescription of anti-obesity pharmacotherapy
IV. Routine primary care screening and BMI assessment
Which of the following represents the correct sequence?
(A) IV, II, III, I
(B) IV, III, II, I
(C) II, IV, I, III
(D) I, III, II, IV

39. Which of the following statements regarding Very Low-Calorie Diets (VLCDs) is incorrect?
(A) VLCDs typically provide between 400 to 800 kcal per day.
(B) They are safe for long-term use without medical supervision.
(C) They are designed to rapidly induce significant weight loss in severe obesity.
(D) They often replace meals with fortified liquid formulas to ensure micronutrient adequacy.

40. As a health professional designing a community-based anti-obesity campaign, which dietary intervention focuses on modifying the "energy density" of the diet?
(A) Recommending the complete substitution of dietary carbohydrates with saturated fats
(B) Advising the regular consumption of dried fruits over fresh fruits to increase nutrient concentration
(C) Encouraging high water and fibre foods like soups and vegetables
(D) Promoting the widespread use of trans fats in food preparation to increase meal palatability

41. Which of the following is a correctly paired adipokine and its metabolic effect?
(A) Adiponectin - Promotes insulin resistance and systemic inflammation
(B) Resistin - Enhances insulin sensitivity in skeletal muscle
(C) Leptin - Primarily stimulates food intake during positive energy balance
(D) TNF-α - Impairs insulin signalling pathways in adipocytes and muscle

42. The concept of dietary energy density is crucial in obesity management. Which macronutrient provides the highest energy density?
(A) Fats
(B) Carbohydrates
(C) Proteins
(D) Dietary Fibre

43. Identify the incorrect pair regarding anthropometric measurements and standard cutoffs for Asian Indian populations.
(A) Normal BMI - 18.5 to 22.9 kg/m^2
(B) Overweight BMI - 23.0 to 24.9 kg/m^2
(C) High risk waist circumference (Men) - $\geq$ 102 cm
(D) High risk waist circumference (Women) - $\geq$ 80 cm

44. Which of the following is NOT a recognized metabolic consequence of central adiposity?
(A) Increased release of free fatty acids into the portal vein
(B) Enhanced production of anti-inflammatory cytokines
(C) Hyperinsulinemia
(D) Ectopic fat deposition in the liver

45. What is the most appropriate and sustainable dietary intervention for long-term weight loss in obese individuals?
(A) A personalized energy deficit of 500-750 kcal/day with balanced macronutrients
(B) A severe and continuous caloric restriction of 500 kcal/day for a period of six months
(C) An exclusive and medically unsupervised liquid protein diet designed for rapid weight reduction
(D) Frequently grazing on high-fat snacks to suppress appetite and prevent hunger throughout the day

46. According to the International Diabetes Federation (IDF) criteria, what is the mandatory prerequisite for diagnosing Metabolic Syndrome?
(A) Significantly elevated fasting blood glucose levels
(B) Consistently high blood pressure readings
(C) Central obesity
(D) Markedly elevated serum triglyceride concentrations

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activity daily while maintaining a high-calorie food diet

31. According to the World Health Organization (WHO), what is the recommended maximum daily intake of salt for adults to prevent hypertension and cardiovascular disease?
(A) Less than 2 grams per day
(B) Less than 5 grams per day
(C) Less than 8 grams per day
(D) Less than 10 grams per day

32. Given below are two statements, one is labelled as Assertion (A) and the other is labelled as Reason (R):
Assertion (A): Many individuals with simple obesity exhibit high circulating levels of leptin rather than a leptin deficiency.
Reason (R): Obesity is commonly characterized by central leptin resistance, where the brain fails to respond adequately to leptin's satiety signals.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

33. Which of the following statements correctly describes energy expenditure in obese individuals compared to lean individuals?
(A) Obese individuals generally have a lower absolute Basal Metabolic Rate (BMR) because fat tissue has extremely low metabolic activity.
(B) Obese individuals typically have a higher absolute BMR due to increased lean mass supporting excess weight.
(C) The thermic effect of food is significantly higher in obese individuals due to enhanced metabolic rate post-digestion.
(D) Physical activity energy expenditure is always higher in obese individuals due to much greater efficiency in muscle contraction.

34. Consider the following statements regarding the aetiology of obesity:
1. An obesogenic environment promotes high energy intake and sedentary behaviour.
2. Genetic mutations, such as in the MC4R gene, account for the majority of common obesity cases.
3. Inadequate sleep can disrupt the balance of ghrelin and leptin, promoting increased appetite.
4. Consumption of high-fructose corn syrup has been linked to increased de novo lipogenesis.

Which of the statements given above are correct?
(A) 1, 3, and 4
(B) 1, 2, and 3
(C) 2, 3, and 4
(D) 1, 2, and 4

35. A female patient presents with a weight of 85 kg and a height of 1.60 meters. Upon calculating her Body Mass Index (BMI), which of the following WHO classifications accurately represents her status?
(A) Overweight (Pre-obese)
(B) Obesity Class I
(C) Obesity Class II
(D) Obesity Class III

36. Match the items in List I with those in List II:
List I: (Appetite-Regulating Hormones)
P. Ghrelin
Q. Leptin
R. Cholecystokinin (CCK)
S. GLP-1
List II: (Primary Site of Production and Action)
I. Adipose tissue; signals long-term energy stores
II. Stomach; stimulates appetite (orexigenic)
III. Distal intestine (L-cells); enhances insulin secretion and promotes satiety
IV. Duodenum; stimulates gallbladder contraction and induces short-term satiety
(A) P-II, Q-I, R-IV, S-III
(B) P-I, Q-II, R-III, S-IV
(C) P-II, Q-IV, R-I, S-III
(D) P-IV, Q-I, R-II, S-III

37. Given below are two statements:
Statement I: Satiety index is a measure of the ability of a food to satisfy hunger and prevent subsequent eating.
Statement II: High-fat, low-fibre foods typically have a higher satiety index than high-protein, high-fibre foods.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

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89. Which of the following is NOT a recommended method to reduce the formation of Heterocyclic Amines (HCAs) during meat preparation?
(A) Pre-cooking meat in a microwave before grilling
(B) Flipping meat frequently during high-heat cooking
(C) Using marinades containing antioxidant-rich herbs like rosemary
(D) Cooking meat to a very well-done state to ensure food safety

90. What is the most effective pre-harvest agricultural strategy to mitigate aflatoxin contamination in maize?
(A) Controlling insects and drought
(B) Irradiating growing crops with gamma rays directly in the field
(C) Spraying agricultural crops with heavy metal solutions prior to harvest
(D) Harvesting food crops when their internal moisture content is highest

91. Epidemic dropsy is a clinical condition resulting from the consumption of edible oils adulterated with the seeds of which plant?
(A) Lathyrus sativus
(B) Argemone mexicana
(C) Brassica juncea
(D) Ricinus communis

92. Given below are two statements, one is labelled as Assertion (A) and the other is labelled as Reason (R):
Assertion (A): Epidemic dropsy is characterized by non-inflammatory, bilateral pitting edema of the lower limbs.
Reason (R): Sanguinarine, the active toxin in argemone oil, interferes with capillary permeability by dilating capillaries and increasing their leakage.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

93. Which of the following statements correctly describes the detection of argemone oil in mustard oil?
(A) The nitric acid test yields a crimson red color.
(B) The standard iodine chemical test turns the adulterated oil blue-black.
(C) The Baudouin test produces a distinct pink color indicating adulteration.
(D) Argemone oil cannot be detected by simple tests, requiring high-end HPLC.

94. Consider the following clinical features:
1. Bilateral pitting edema of lower limbs
2. Glaucoma and visual disturbances
3. Spastic paraplegia and scissor gait
4. Erythema and mottling of skin
Which of these are characteristic clinical features of Epidemic Dropsy?
(A) 1, 2, and 4
(B) 1, 2, and 3
(C) 2, 3, and 4
(D) 1, 3, and 4

95. An outbreak occurs in a village where several families present with sudden swelling of legs, diarrhea, and localized skin erythema. An investigation reveals they all consumed loosely sold mustard oil from the same vendor. What is the suspected toxin?
(A) β-N-oxalyl-L-α,β-diaminopropionic acid (β-ODAP)
(B) Gossypol
(C) Aflatoxin
(D) Sanguinarine

96. Match the items in List I with those in List II:
List I: (Naturally Occurring Toxins)
P. Sanguinarine
Q. β-ODAP
R. Pyrrolizidine alkaloids
S. Aflatoxin
List II: (Associated Diseases)
I. Veno-occlusive disease of the liver
II. Epidemic Dropsy
III. Hepatocellular carcinoma
IV. Neurolathyrism
(A) P-II, Q-IV, R-I, S-III
(B) P-IV, Q-II, R-III, S-I
(C) P-II, Q-IV, R-III, S-I
(D) P-I, Q-IV, R-II, S-III

97. Given below are two statements:
Statement I: Neurolathyrism is an irreversible, non-progressive paralysis of the lower limbs.
Statement II: It is caused by the neurotoxin β-ODAP found in Khesari dal (Lathyrus sativus), which acts as an analogue of glutamate causing

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47. Given below are two statements, one is labelled as Assertion (A) and the other is labelled as Reason (R):
Assertion (A): Insulin resistance is considered a core pathophysiological driver of Metabolic Syndrome.
Reason (R): Insulin resistance impairs glucose uptake in skeletal muscle and fails to suppress hepatic glucose production and lipolysis.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

48. Which of the following statements correctly identifies the metabolic changes associated with Metabolic Syndrome?
(A) Decreased plasminogen activator inhibitor-1 (PAI-1) levels leading to bleeding tendencies
(B) Elevated levels of high-density lipoprotein (HDL) cholesterol
(C) Increased hepatic synthesis of VLDL due to excess free fatty acid flux
(D) Heightened sensitivity of peripheral tissues to endogenous insulin

49. Consider the following clinical parameters:
1. Fasting triglycerides $\geq$ 150 mg/dL
2. Blood pressure $\geq$ 130/85 mmHg
3. HDL cholesterol $\geq$ 60 mg/dL in men
4. Fasting plasma glucose $\geq$ 100 mg/dL
Which of these are defining components of Metabolic Syndrome?
(A) 1, 2, and 4
(B) 1, 2, and 3
(C) 2, 3, and 4
(D) 1, 3, and 4

50. A 50-year-old male has a waist circumference of 105 cm, blood pressure of 135/88 mmHg, fasting glucose of 110 mg/dL, triglycerides of 160 mg/dL, and HDL of 35 mg/dL. Based on his nutritional status and diagnostic criteria, which condition does he unequivocally have?
(A) Type 1 Diabetes Mellitus
(B) Cushing's Syndrome
(C) Familial Hypercholesterolemia
(D) Metabolic Syndrome

51. Match the items in List I with those in List II:
List I: (Dietary Factors)
P. Aflatoxin B_1
Q. Dietary Fibre
R. High Saturated Fat
S. Vitamin C
List II: (Role in Cancer Mechanisms)
I. Acts as a promoter by increasing secondary bile acids
II. Scavenges free radicals, inhibiting initiation
III. Undergoes hepatic biotransformation to form DNA adducts
IV. Dilutes fecal carcinogens and decreases transit time
(A) P-III, Q-IV, R-I, S-II
(B) P-I, Q-II, R-III, S-IV
(C) P-III, Q-I, R-IV, S-II
(D) P-IV, Q-III, R-II, S-I

52. Given below are two statements:
Statement I: Epigenetic modifications induced by dietary bioactive compounds can silence tumor suppressor genes, leading to cancer.
Statement II: Dietary components like folate and choline act as methyl donors, influencing DNA methylation patterns.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false but Statement II is true.
(D) Statement I is true but Statement II is false.

53. Which of the following represents the cause-and-effect relationship between chronic high-fat diets and carcinogenesis in the colon?
(A) High fat intake $\rightarrow$ Increased primary bile acids $\rightarrow$ Bacterial conversion to secondary bile acids $\rightarrow$ Colon mucosal hyperproliferation
(B) High fat intake $\rightarrow$ Decreased fecal transit time in the colon $\rightarrow$ Reduced overall exposure of mucosal cells to dietary mutagens $\rightarrow$ Accelerated apoptosis of stem cells
(C) High fat intake $\rightarrow$ Increased short-chain fatty acid production by gut microflora $\rightarrow$ Downregulation and inhibition of COX-2 pathways $\rightarrow$ Direct tumor suppression
(D) High fat intake $\rightarrow$ Enhanced dietary calcium binding $\rightarrow$ Rapid formation of insoluble fatty acid soaps $\rightarrow$ Direct DNA damage and somatic mutations

54. Which of the following statements about free radicals and cancer initiation is incorrect?
(A) Reactive oxygen species (ROS) generated during metabolic stress can cause extensive single and double-strand DNA breaks.

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71. Which of the following is a correctly paired antioxidant and its primary cellular location/ target for protection?
(A) Vitamin C - Protects lipophilic structures deep inside the cell membrane
(B) Vitamin E - Protects lipid membranes from lipid peroxidation
(C) Beta-carotene - Exclusively protects blood plasma proteins
(D) Selenium - Directly scavenges singlet oxygen without enzyme systems

72. The concept of "synergy" in dietary antioxidants suggests that:
(A) Taking high-dose single antioxidant supplements is more effective than eating whole foods.
(B) Antioxidants compete for absorption, thus cancelling each other's effects.
(C) Antioxidants like Vitamin C can regenerate oxidized Vitamin E, working cooperatively.
(D) Antioxidants become pro-oxidants when consumed together in a meal.

73. Identify the incorrect pair regarding food processing/cooking methods and the primary carcinogen formed.
(A) Smoking of meats - Polycyclic Aromatic Hydrocarbons (PAHs)
(B) High-temperature pan-frying of muscle meat - Heterocyclic Amines (HCAs)
(C) Deep-frying of carbohydrate-rich foods - Acrylamide
(D) Fermentation of dairy - N-nitrosamines

74. Which of the following dietary constituents does NOT protect against oxidative stress and diet-related carcinogenesis?
(A) Trans fats
(B) Lutein pigment
(C) Selenium mineral
(D) Cryptoxanthin compound

75. What is the safest and most appropriate cooking method for red meat to minimize the formation of Heterocyclic Amines (HCAs) and Polycyclic Aromatic Hydrocarbons (PAHs)?
(A) Charbroiling over an open wood-fired flame
(B) Braising at lower temperatures
(C) Rapid pan-frying at extremely high temperatures
(D) Commercial deep-fat frying in hydrogenated oils

76. Aflatoxins are potent naturally occurring mycotoxins. Which specific fungal species is the primary producer of aflatoxins in food crops?
(A) Fusarium graminearum
(B) Aspergillus flavus
(C) Penicillium expansum
(D) Claviceps purpurea

77. Given below are two statements, one is labelled as Assertion (A) and the other is labelled as Reason (R):
Assertion (A): Dietary exposure to Aflatoxin B_1 is a major risk factor for hepatocellular carcinoma.
Reason (R): Aflatoxin B_1 is converted in the liver by cytochrome P450 enzymes into an exo-8,9-epoxide, which binds to DNA, specifically mutating the p53 tumor suppressor gene.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

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78. Which of the following statements correctly describes the conditions favoring aflatoxin contamination in food?
(A) Aflatoxins are primarily produced under freezing storage conditions where fungal spores remain completely dormant.
(B) Aflatoxin production is completely halted at temperatures above 25°C due to rapid enzyme denaturation processes.
(C) High moisture and warm storage temperatures promote Aspergillus growth and aflatoxin synthesis.
(D) Exposure to direct UV light during storage increases aflatoxin synthesis by stimulating protective fungal pathways.

79. Consider the following factors influencing acrylamide formation in foods:
1. Cooking at temperatures above 120°C.
2. High moisture content during boiling.
3. Presence of the amino acid asparagine.
4. Presence of reducing sugars like glucose and fructose.

Which of these factors are required for the Maillard reaction to produce acrylamide?
(A) 1, 3, and 4
(B) 1, 2, and 3
(C) 2, 3, and 4

(C) They significantly suppress the adaptive immune system to prevent any potential autoimmune reactions against developing tumors.
(D) They induce Phase II enzymes like glutathione S-transferase, facilitating carcinogen excretion.

64. Consider the following statements regarding the protective dietary factors against cancer:
1. Lycopene in tomatoes is associated with a reduced risk of prostate cancer.
2. Glucosinolates in cruciferous vegetables are metabolized to isothiocyanates, which have anti-carcinogenic properties.
3. High calcium intake is strongly linked to an increased risk of colorectal cancer.
4. Epigallocatechin gallate (EGCG) in green tea can inhibit tumor angiogenesis.

Which of the statements given above are correct?
(A) 1, 2, and 4
(B) 1, 2, and 3
(C) 2, 3, and 4
(D) 1, 3, and 4

65. A consumer frequently eats heavily processed hot dogs and bacon, which are cured using sodium nitrite. In the acidic environment of the stomach, nitrites can react with amines to form which potent class of carcinogens?
(A) Aflatoxins
(B) N-nitrosamines
(C) Polycyclic Aromatic Hydrocarbons (PAHs)
(D) Heterocyclic amines (HCAs)

66. Match the items in List I with those in List II:
List I: (Specific Phytochemicals)
P. Anthocyanins
Q. Resveratrol
R. Allicin
S. Isoflavones
List II: (Major Dietary Sources)
I. Garlic and onions
II. Berries and red grapes
III. Soybeans and soy products
IV. Skin of red grapes and red wine
(A) P-II, Q-IV, R-I, S-III
(B) P-IV, Q-II, R-III, S-I
(C) P-II, Q-IV, R-III, S-I
(D) P-IV, Q-II, R-I, S-III

67. Given below are two statements:
Statement I: High consumption of red meat is classified as probably carcinogenic to humans (Group 2A).
Statement II: Heme iron present in red meat can catalyze the formation of lipid oxidation products and N-nitroso compounds in the gut.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

68. Arrange the sequence of events leading to carcinogenesis from the consumption of processed meats:
I. Interaction of secondary amines with nitrous acid in the stomach
II. Addition of sodium nitrite to meat for curing and preservation
III. Formation of DNA adducts leading to mutations
IV. Formation of N-nitrosamines
Which of the following represents the correct sequence?
(A) II, I, IV, III
(B) I, II, III, IV
(C) II, IV, I, III
(D) IV, II, I, III

69. Which of the following statements about cruciferous vegetables and cancer protection is incorrect?
(A) Boiling extensively maximizes their anti-cancer properties.
(B) They include a wide variety of green vegetables like broccoli, cabbage, and cauliflower.
(C) They contain naturally high levels of the active enzyme myrosinase which helps form sulforaphane.
(D) Their active bioactive compounds enhance the cellular elimination of carcinogens via Phase II pathways.

70. As a Food Safety Officer inspecting a meat processing facility, which regulatory limit is crucial to monitor to minimize the risk of diet-related carcinogenesis from cured meats?
(A) Permissible ascorbic acid limits
(B) Permissible sodium chloride limits
(C) Permissible monosodium glutamate limits
(D) Sodium nitrite/nitrate limits

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(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

23. Which of the following represents the correct cause-and-effect relationship regarding sodium intake and cardiovascular health?
(A) High dietary sodium → Decreased blood volume → Reduced peripheral resistance → Hypertension
(B) High dietary sodium → Increased water retention → Increased cardiac output → Hypertension
(C) Low dietary sodium → Activation of RAAS → Vasodilation → Hypotension
(D) High dietary sodium → Enhanced nitric oxide synthesis → Endothelial dysfunction → Hypertension

24. Which of the following statements about the dietary management of hypertension is incorrect?
(A) Reducing sodium intake to less than 2 grams per day is recommended by the WHO.
(B) Weight reduction in obese individuals significantly lowers both systolic and diastolic blood pressure.
(C) Alcohol consumption has a hypotensive effect and should be encouraged in hypertensive patients.
(D) Potassium supplementation can help lower blood pressure in individuals with high sodium intake.

25. A Food Safety Officer is designing educational material for a community with high rates of hypertension. Which dietary advice reflects the most accurate application of the DASH diet principles?
(A) Eliminate all dietary fats and consume 10-12 servings of refined grains daily
(B) Rely heavily on calcium and magnesium mineral supplements rather than whole foods
(C) Increase intake of processed red meat for iron, while reducing dairy consumption
(D) Consume 4-5 servings of fruits and vegetables, and limit saturated fats

26. Which of the following is a correctly paired DASH diet food groups and their target nutrients?
(A) Nuts and seeds - Rich source of magnesium, potassium, and fibre
(B) Low-fat dairy - Rich source of sodium and iron
(C) Fruits and vegetables - Rich source of saturated fats and calcium
(D) Lean meats - Rich source of vitamin C and dietary fibre

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27. The concept of the sodium-to-potassium ratio is critical in managing hypertension. A diet optimal for lowering blood pressure should ideally have:
(A) A molar ratio of sodium to potassium greater than 2:1
(B) A molar ratio of sodium to potassium close to 1:1 or lower
(C) High sodium and zero potassium to prevent arrhythmias
(D) Equal amounts of sodium and calcium, disregarding potassium

28. Identify the incorrect pair regarding sugar substitutes and their properties in diabetic diets.
(A) Aspartame - Contains phenylalanine, chemically unsafe for phenylketonurics
(B) Saccharin - High-calorie sweetener, causing severe hyperglycemia
(C) Sucralose - Chlorinated derivative of sucrose, highly heat stable in baking
(D) Stevia - Naturally derived, zero-calorie non-nutritive sweetener

29. Which of the following dietary components is NOT recommended for reducing the risk of hypertension?
(A) Licorice root extract with glycyrrhizin
(B) Dietary inorganic nitrates from green leafy vegetables
(C) High-calcium low-fat dairy products for bone health
(D) Long-chain omega-3 fatty acids from fatty marine fish

30. What is the most appropriate and sustainable lifestyle modification for an individual diagnosed with prediabetes to prevent the progression to Type 2 Diabetes?
(A) Adopting a strict zero-carbohydrate ketogenic diet indefinitely without medical supervision
(B) Depending solely on oral hypoglycaemic pharmacotherapy agents without making any dietary changes
(C) Achieving 5-10% weight loss via balanced hypocaloric diet and moderate exercise
(D) Engaging in four hours of vigorous physical

(D) 1, 2, and 4

80. A batch of raw groundnuts (peanuts) was harvested during heavy rains and stored in poorly ventilated, high-humidity silos for months. If consumed in large quantities over a long period, which specific disease risk is highest for the consumers?
(A) Chronic gastric ulcer
(B) Acute renal failure
(C) Liver cancer
(D) Active pulmonary tuberculosis

81. Match the items in List I with those in List II:
List I: (Process-Induced Carcinogens)
P. Acrylamide
Q. Aflatoxin M_1
R. Heterocyclic Amines
S. Polycyclic Aromatic Hydrocarbons
List II: (Typical Foods They Contaminate)
I. Milk from cows fed contaminated feed
II. French fries and potato crisps
III. Charbroiled burgers (smoke deposited on surface)
IV. Grilled chicken breast (formed in muscle tissue)
(A) P-II, Q-I, R-IV, S-III
(B) P-I, Q-II, R-III, S-IV
(C) P-II, Q-IV, R-I, S-III
(D) P-IV, Q-I, R-II, S-III

82. Given below are two statements:
Statement I: Acrylamide is naturally present in raw potatoes and raw coffee beans before any processing.
Statement II: Acrylamide forms primarily through the Maillard reaction during high-temperature baking, roasting, or frying.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false but Statement II is true.
(D) Statement I is true but Statement II is false.

83. Which of the following represents the correct cause-and-effect relationship in the formation of Heterocyclic Amines (HCAs)?
(A) High heat cooking → Reaction of creatine, amino acids, and sugars → HCAs in muscle meats
(B) Low temperature boiling → Rapid denaturation of collagen proteins → Accumulation of structural HCAs
(C) Traditional fermentation → Prolonged bacterial action on animal lipids → De novo formation of HCAs
(D) Smoking of meat → Surface deposition of incomplete wood combustion products → Direct formation of HCAs

84. Which of the following statements regarding Heterocyclic Amines (HCAs) is incorrect?
(A) They are formed in skeletal muscle meats (beef, pork, poultry, fish) upon high-heat cooking.
(B) Marinating meats before grilling can reduce HCA formation.
(C) They are abundantly formed in grilled vegetables and tofu.
(D) They are process-induced carcinogens linked to colorectal and prostate cancers.

85. As a Food Safety Officer providing guidance to a commercial bakery, which strategy would you legally and scientifically recommend to mitigate acrylamide formation in their biscuits?
(A) Add asparaginase before baking
(B) Increase overall baking temperature to reduce total baking time
(C) Substitute standard sucrose with high-fructose corn syrup sweeteners
(D) Store raw white potatoes in a cold refrigerator before domestic use

86. Which of the following is a correctly paired toxic compound and its target organ for carcinogenesis or toxicity?
(A) Acrylamide - Human pancreatic tissues
(B) Beta-ODAP - Human renal nephrons
(C) Sanguinarine - Human pulmonary system
(D) Aflatoxin B_1 - Liver

87. The concept of mitigating acrylamide involves targeting its precursors. Which specific amino acid is the primary precursor for acrylamide formation in carbohydrate-rich foods?
(A) Glutamine
(B) Asparagine
(C) Methionine
(D) Lysine

88. Identify the incorrect pair regarding a mycotoxin and its typical producing fungal species.
(A) Ochratoxin A - Aspergillus ochraceus
(B) Patulin - Penicillium expansum
(C) Aflatoxin - Claviceps purpurea
(D) Fumonisin - Fusarium verticillioides

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(B) Chronic oxidative stress chemically alters purine and pyrimidine bases, forming carcinogenic adducts like 8-OHdG.
(C) Standard dietary antioxidants can effectively neutralize active free radicals by directly donating a stable electron.
(D) Endogenous enzymes like SOD form hydroxyl radicals to destroy cancer cells.

55. As an FSO evaluating a food product claiming to "Prevent Metabolic Syndrome," which ingredient profile would render this claim scientifically baseless and potentially fraudulent?
(A) High levels of soluble fibre extracted from whole grain oats and barley crops
(B) Fortification with high-fructose corn syrup and hydrogenated oils
(C) Significant presence of natural plant sterols and monounsaturated fatty acids
(D) Very low sodium content combined with a complete lack of any added simple sugars

56. Which of the following is correctly paired regarding a carcinogen and its primary dietary source?
(A) Benzopyrene - Freshly boiled green vegetables
(B) Heterocyclic amines - Raw fresh citrus fruits
(C) Nitrosamines - Cured and processed meats
(D) Acrylamide - Unpasteurized raw whole milk

57. The concept of dietary angiogenesis inhibition implies that certain food compounds can prevent cancer progression by:
(A) Causing immediate and direct necrosis of localized tumor cells
(B) Enhancing the systematic metastasis of tumor cells to distant organs
(C) Altering the systematic pH of the blood to become highly alkaline
(D) Inhibiting new blood vessel formation supplying the tumor

58. Identify the incorrect pair regarding markers of Metabolic Syndrome and their diagnostic threshold (IDF criteria for Asians).
(A) HDL cholesterol (Men) - $\geq$ 50 mg/dL
(B) Fasting plasma blood glucose - $\geq$ 100 mg/dL
(C) Systolic/diastolic blood pressure - $\geq$ 130/85 mmHg
(D) Fasting serum triglycerides - $\geq$ 150 mg/dL

59. Which of the following is NOT considered an independent determinant or risk factor in the development of Metabolic Syndrome?
(A) Adopting an extremely sedentary lifestyle
(B) Intake of insoluble fibre
(C) High dietary intake of refined simple sugars
(D) Inherited polygenic predisposition factors

60. What is the best dietary pattern recommended for managing and reversing the components of Metabolic Syndrome?
(A) Western diet high in ultra-processed foods
(B) Mediterranean diet rich in MUFAs, whole grains, and omega-3s
(C) A strictly low-protein, high-refined-carbohydrate diet
(D) Carnivore diet consisting exclusively of red and processed meats

61. Which of the following combinations of vitamins primarily act as dietary antioxidants to protect cells from oxidative damage?
(A) Vitamin C, Vitamin E, Beta-carotene
(B) Vitamin A, Vitamin D, Vitamin K
(C) Vitamin B_1, Vitamin B_6, Vitamin B_{12}
(D) Biotin, Pantothenic acid, Folic acid

62. Given below are two statements, one is labelled as Assertion (A) and the other is labelled as Reason (R):
Assertion (A): A high intake of dietary fibre is inversely associated with the risk of colorectal cancer.
Reason (R): Dietary fibre fermentation by gut microbiota produces butyrate, which promotes apoptosis and inhibits the proliferation of colon cancer cells.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

63. Which of the following statements correctly describes the protective mechanism of phytochemicals against cancer?
(A) They act exclusively by altering the macroscopic structure of the gastrointestinal tract to prevent physical contact with toxins.
(B) They actively promote the enzymatic conversion of benign pro-carcinogens into highly reactive active carcinogens.

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excitotoxicity.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

98. Arrange the steps involved in the traditional "steeping method" to detoxify Khesari dal (Lathyrus sativus) and reduce β-ODAP content:
I. Draining off the water
II. Boiling the seeds in large quantities of water
III. Sun drying the seeds
IV. Soaking the seeds in hot water for a couple of hours
Which of the following represents the correct sequence?
(A) II, IV, I, III
(B) II, I, IV, III
(C) IV, I, II, III
(D) I, II, IV, III

99. Which of the following statements regarding Lathyrism is incorrect?
(A) It causes sensory loss and intellectual impairment in addition to motor paralysis.
(B) It predominantly affects young males more severely than females.
(C) The condition manifests after prolonged, continuous consumption of Lathyrus sativus as a staple diet.
(D) Parboiling is an effective commercial method to remove the toxin.

100. As a Food Safety Officer, if you suspect adulteration of mustard oil with argemone oil, which simple spot test can you perform in the field or basic lab to tentatively confirm the adulteration?
(A) Halphen test
(B) Köttstorfer number analysis
(C) Nitric acid test
(D) Benedict's test

101. Which of the following is a correctly paired adulterant and its specific chemical detection test?
(A) Metanil yellow in turmeric - Hydrochloric acid test
(B) Argemone oil in mustard oil - Baudouin chemical test for sesame oil
(C) Vanaspati in ghee - Concentrated nitric acid precipitation test
(D) Starch in milk - Aqueous bromine water decolorization test

102. The mechanism of neurotoxicity of β-ODAP in lathyrism involves "excitotoxicity." This implies the toxin primarily overstimulates which receptors in the central nervous system?
(A) Inhibitory GABA receptors
(B) Excitatory dopamine receptors
(C) Endogenous acetylcholine receptors
(D) Glutamate receptors

103. Identify the incorrect pair regarding a plant-derived toxin and its source.
(A) Solanine - Green potatoes
(B) Sanguinarine - Soybean
(C) β-ODAP - Lathyrus sativus
(D) Cyanogenic glycosides - Cassava roots

104. Which of the following clinical signs is NOT a symptom of neurolathyrism?
(A) Progressive scissor-like spastic gait
(B) Marked muscular rigidity and spasticity in the lower limbs
(C) Flaccid paralysis
(D) Exaggerated knee and ankle deep tendon jerks

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105. What is the most effective long-term agricultural and policy control measure to eliminate lathyrism?
(A) Strictly banning all pulse crops in severely drought-prone regions
(B) Spraying crops with synthetic anti-toxin chemicals prior to harvest
(C) Fortifying harvested Khesari dal with dry Vitamin C crystals post-harvest
(D) Cultivating toxin-free Lathyrus sativus varieties

106. According to the Bureau of Indian Standards (BIS), what is the permissible limit (acceptable limit) of fluoride in drinking water?
(A) 0.5 mg/L
(B) 1.0 mg/L
(C) 1.5 mg/L
(D) 2.5 mg/L

107. Given below are two statements, one is labelled as Assertion (A) and the other is labelled as Reason (R):
Assertion (A): Prolonged consumption of water containing fluoride levels above 3-4 mg/L leads to skeletal fluorosis.
Reason (R): Fluoride has a high affinity for

18. (D) Soluble fibre delays carbohydrate absorption, reducing postprandial glucose spikes
Soluble dietary fiber forms a highly viscous gel-like matrix within the gastrointestinal tract, which physically slows down gastric emptying and carbohydrate digestion. This mechanism delays the absorption of glucose in the small intestine, resulting in a more gradual rise in blood sugar and significantly reducing postprandial glucose spikes, supporting long-term glycaemic control in diabetes.

19. (A) 1, 2, and 4
Effective dietary management of type 2 diabetes involves monitoring total carbohydrate quantity, distributing carbohydrate intake evenly throughout the day, and using non-nutritive sweeteners to assist with weight management. Consuming a high-fructose diet is not recommended because excessive fructose stimulates hepatic lipogenesis, which exacerbates insulin resistance, elevates circulating triglycerides, and worsens overall metabolic health.

20. (C) Administration of 15-20 grams of fast-acting simple sugars
The patient is experiencing acute hypoglycemia, a common adverse effect of sulfonylureas. Immediate management requires the fifteen-gram rule, involving the administration of fast-acting simple sugars, such as fruit juice or glucose tablets, to rapidly elevate blood glucose levels. Complex carbohydrates, proteins, and fats delay digestion and absorption, making them inappropriate for resolving acute, symptomatic hypoglycemia.

21. (A) P-IV, Q-I, R-II, S-III
The glycaemic index ranks carbohydrates based on postprandial blood glucose responses, while glycaemic load accounts for both the quality and quantity of carbohydrates consumed. Resistant starch is a type of starch that escapes enzymatic digestion in the small intestine, acting as dietary fiber. Sugar alcohols are low-calorie polyols that produce a minimal blood glucose response.

22. (D) Statement I is false but Statement II is true.
The Dietary Approaches to Stop Hypertension eating plan is specifically designed to lower blood pressure by restricting sodium intake while promoting minerals like potassium, magnesium, and calcium. It emphasizes high consumption of fruits, vegetables, whole grains, and low-fat dairy products. Therefore, stating that this dietary pattern prioritizes high sodium and low potassium intake is fundamentally incorrect.

23. (B) High dietary sodium → Increased water retention → Increased cardiac output → Hypertension
High dietary sodium consumption increases extracellular fluid volume through osmotic water retention. This expansion of blood volume leads to elevated venous return and increased cardiac output. Over time, the persistent increase in blood volume and cardiac output, combined with compensatory increases in peripheral vascular resistance, leads to the development of chronic arterial hypertension and cardiovascular strain.

24. (C) Alcohol consumption has a hypotensive effect and should be encouraged in hypertensive patients.
Alcohol consumption does not exert a protective hypotensive effect; instead, chronic or excessive intake is a well-established risk factor that raises blood pressure and limits the effectiveness of antihypertensive therapies. Effective non-pharmacological management of hypertension focuses on reducing daily sodium intake, increasing dietary potassium through whole foods, and achieving weight loss in overweight or obese individuals.

25. (D) Consume 4-5 servings of fruits and vegetables, and limit saturated fats
DASH diet principles focus on a dietary pattern rich in potassium, magnesium, and calcium to promote vasodilation and lower blood pressure. This is achieved by consuming four to five daily servings of fruits and vegetables, choosing whole grains, and limiting saturated fats and cholesterol. Relying on isolated mineral supplements or consuming high-sodium processed meats contradicts these guidelines.

26. (A) Nuts and seeds - Rich source of magnesium, potassium, and fibre
Nuts and seeds are highly recommended in the DASH diet because they are excellent natural sources of magnesium, potassium, monounsaturated fats, and dietary fiber. These nutrients collectively support endothelial function and blood pressure regulation. Conversely, low-fat dairy is primarily valued for calcium rather than sodium, and fruits provide potassium and vitamin C rather than saturated fats.

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interventions would you promote alongside water defluoridation to mitigate fluoride toxicity?
(A) High intake of Vitamin C, Calcium, and Antioxidants
(B) High intake of simple carbohydrates and low protein
(C) High intake of phosphorus and low calcium
(D) Exclusive reliance on reverse osmosis water with zero mineral content

116. Which of the following is a correctly paired defluoridation material and its working mechanism?
(A) Bleaching powder - Oxidation of fluoride gas
(B) Potassium permanganate - Coagulation of fluoride
(C) Activated Alumina - Adsorption of fluoride ions
(D) Activated carbon - Neutralization of fluoride pH

117. The concept of dietary goitrogens is relevant in areas with marginal iodine intake. How do goitrogens like thiocyanates (found in cabbage) exacerbate iodine deficiency?
(A) By competitively inhibiting iodine uptake by the thyroid
(B) By directly and irreversibly destroying the functional thyroid tissue
(C) By significantly increasing the overall renal excretion of dietary iodine
(D) By completely preventing the absorption of iodine within the small intestine

118. Identify the incorrect pair regarding the spectrum of Iodine Deficiency Disorders (IDD) and the affected life stage.
(A) Fetus - Endemic cretinism, stillbirths
(B) Neonate - Neonatal goitre, neonatal hypothyroidism
(C) Child/Adolescent - Impaired mental function, delayed physical development
(D) Adult - Hyperthyroidism, increased basal metabolic rate

119. Which of the following chemicals is NOT a component used in the Nalgonda technique for water defluoridation?
(A) Alum (Aluminum sulfate)
(B) Potassium iodate
(C) Lime (Calcium oxide)
(D) Bleaching powder

120. What is the most reliable biological indicator for assessing the recent iodine status and prevalence of IDD in a community?
(A) Circulating serum TSH hormone levels in healthy adults
(B) Sizing of thyroid gland via high-resolution ultrasound
(C) Urinary iodine excretion in children
(D) Total serum thyroglobulin concentration measurements

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121. Under the Universal Salt Iodisation (USI) programme in India, which specific chemical compound is legally mandated for fortifying edible salt?
(A) Potassium iodide
(B) Sodium iodide
(C) Calcium iodate
(D) Potassium iodate

122. Given below are two statements, one is labelled as Assertion (A) and the other is labelled as Reason (R):
Assertion (A): Potassium iodate (KIO_3) is preferred over potassium iodide (KI) for salt iodisation in tropical countries like India.
Reason (R): Potassium iodate is chemically more stable under conditions of high humidity, heat, and impurities found in unrefined salt.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

123. Which of the following statements correctly describes Double Fortified Salt (DFS)?
(A) It is fortified with standard levels of both active Iodine and fat-soluble Vitamin A.
(B) It is fortified with both Iodine and Iron to treat IDD and anaemia.
(C) It contains exactly double the standard federally mandated dosage of potassium iodate salt.
(D) It is fortified with zinc and iron to selectively treat pediatric cognitive deficits.

124. Consider the following clinical signs:
1. Bitot's spots
2. Corneal xerosis
3. Night blindness
4. Keratomalacia

ANSWERS

1. (B) Shift from complex carbohydrates to refined sugars and high-fat foods
The global nutrition transition is characterized by a significant shift from traditional diets rich in fiber and complex carbohydrates to modernized diets high in refined sugars, fats, and ultra-processed foods. This dietary pattern contributes to obesity, metabolic syndrome, and the rapid rise of non-communicable diseases such as cardiovascular disorders and type 2 diabetes worldwide.

2. (C) A is true but R is false.
Excessive intake of trans-fatty acids significantly elevates the risk of coronary heart disease. However, the mechanism involves raising low-density lipoprotein cholesterol while simultaneously lowering high-density lipoprotein cholesterol levels, rather than lowering low-density lipoprotein. This unfavorable alteration of the lipid profile promotes atherosclerosis, arterial plaque formation, and adverse cardiovascular events in affected individuals.

3. (A) Soluble fibre binds to bile acids in the intestine, promoting their excretion and lowering serum cholesterol.
Soluble dietary fiber plays a vital role in cardiovascular protection by forming a viscous gel in the gastrointestinal tract. This gel binds to cholesterol-rich bile acids, preventing their reabsorption in the ileum and promoting excretion. Consequently, the liver must utilize circulating low-density lipoprotein cholesterol to synthesize new bile acids, lowering serum cholesterol levels.

4. (B) 1, 2, and 4
High sodium intake is strongly associated with hypertension, and this hypertensive effect is further exacerbated by low potassium intake. Additionally, phytosterols, which are plant-derived compounds structurally similar to cholesterol, competitively inhibit intestinal cholesterol absorption. Conversely, omega-3 fatty acids reduce rather than increase thrombogenesis, making them protective against cardiovascular disease development.

5. (A) Predominance of small, dense LDL particles
A diet high in refined carbohydrates and trans fats, coupled with low fruit intake, drives hepatic very-low-density lipoprotein synthesis and elevates triglycerides. This metabolic state stimulates cholesteryl ester transfer protein, leading to the formation of small, dense low-density lipoprotein particles. These small particles are highly atherogenic as they easily penetrate the arterial intima and undergo oxidation.

6. (A) P-IV, Q-II, R-I, S-III
Different dietary fats have distinct effects on the lipid profile. Myristic acid, a saturated fat, significantly raises both total and low-density lipoprotein cholesterol. Linoleic acid lowers low-density lipoprotein but can lower high-density lipoprotein in large amounts. Eicosapentaenoic acid lowers serum triglycerides significantly, while elaidic acid, a trans fat, simultaneously raises low-density lipoprotein and lowers high-density lipoprotein.

7. (D) Statement I is false but Statement II is true.
Replacing saturated fats with refined carbohydrates does not reduce cardiovascular risk, and may instead worsen metabolic profiles. Refined carbohydrates stimulate hepatic de novo lipogenesis, raising triglycerides and reducing high-density lipoprotein cholesterol. Optimal cardiovascular risk reduction is achieved when saturated fats are substituted with polyunsaturated fatty acids or complex carbohydrates containing high dietary fiber.

8. (B) II, I, IV, III
The pathophysiology of diet-induced atherosclerosis begins with the accumulation of circulating low-density lipoprotein cholesterol in the arterial intima. Once trapped, these particles undergo chemical oxidation. Endothelial cells then release adhesion molecules to recruit circulating macrophages, which engulf the oxidized particles. This process leads to the formation of foam cells, which aggregate to create visible fatty streaks.

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mobilization of Vitamin A stores.
(D) Dietary carotenoids are converted to retinol at an accelerated, highly toxic metabolic rate in the liver.

133. Identify the incorrect pair regarding iron status biomarkers and their physiological meaning.
(A) sTfR - Decreases during iron deficiency
(B) Serum ferritin - Quantitative indicator of total body iron stores
(C) Transferrin saturation - Reliable indicator of active iron transport
(D) Hemoglobin concentration - Indicator of functional iron and anemia

134. Which of the following is NOT a dietary inhibitor of non-heme iron absorption?
(A) Phytates from whole grains
(B) Polyphenols from tea and coffee
(C) Calcium from dairy products
(D) Ascorbic acid from citrus fruits

135. What is the most sustainable and cost-effective population-level strategy to combat hidden hunger (micronutrient deficiencies) in a developing country?
(A) Distributing expensive pharmaceutical supplements to every citizen on a daily basis
(B) Mandatory fortification of staple foods
(C) Encouraging the exclusive consumption of costly, highly exotic imported fruits
(D) Completely banning the commercial milling of all cereal grains and pulses

136. What is the classic clinical manifestation of severe zinc deficiency in humans?
(A) Pellagra due to niacin deficiency
(B) Scurvy due to vitamin C deficiency
(C) Acrodermatitis enteropathica
(D) Beriberi due to thiamine deficiency

137. Given below are two statements, one is labelled as Assertion (A) and the other is labelled as Reason (R):
Assertion (A): Zinc deficiency is associated with impaired immune function and increased susceptibility to infections.
Reason (R): Zinc is crucial for the normal development and function of cells mediating innate immunity, neutrophils, and NK cells, as well as T-lymphocytes.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

138. Which of the following statements correctly describes the nutritional management of zinc deficiency?
(A) Soaking and germinating legumes reduces phytates, enhancing zinc absorption.
(B) Animal proteins are poor sources of bioavailable zinc, providing virtually zero trace minerals.
(C) High doses of iron supplements enhance dietary zinc absorption through competitive transport pathways.
(D) Zinc toxicity is completely non-existent in humans, making unlimited supplement dosing safe.

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139. Consider the following dietary modifications:
1. Restriction of dietary protein
2. Restriction of sodium and fluid
3. Restriction of potassium and phosphorus
4. High intake of Vitamin A and magnesium
Which of these are standard dietary management principles for a patient with severe Chronic Kidney Disease (CKD) on conservative management (pre-dialysis)?
(A) 1, 2, and 3
(B) 1, 2, and 4
(C) 2, 3, and 4
(D) 1, 3, and 4

140. A patient with advanced liver cirrhosis develops hepatic encephalopathy, characterized by confusion and altered consciousness. This condition is primarily driven by the accumulation of which neurotoxic byproduct of protein metabolism?
(A) Urea
(B) Ammonia
(C) Creatinine
(D) Uric acid

141. Match the items in List I with those in List II:
List I: (Disease Condition)
P. Chronic Kidney Disease (Anuric)
Q. Hepatic Encephalopathy
R. Hypertension
S. Celiac Disease
List II: (Nutrient restricted or monitored)
I. Sodium

Which of these are clinical manifestations of Vitamin A deficiency (Xerophthalmia)?
(A) 1, 2, and 3
(B) 1, 3, and 4
(C) 2, 3, and 4
(D) 1, 2, 3, and 4

125. A 4-year-old child presents with a history of recurrent respiratory infections and difficulty seeing in dim light. Examination reveals raised, silvery-white, foamy triangular patches on the bulbar conjunctiva. What is the precise diagnosis?
(A) Bitot's spots
(B) Corneal ulceration
(C) Keratomalacia
(D) Conjunctival xerosis

126. Match the items in List I with those in List II:
List I: (WHO Classification of Xerophthalmia Stages)
P. X1A
Q. X1B
R. X2
S. X3A
List II: (Clinical Signs)
I. Corneal ulceration $< 1/3$ of cornea
II. Corneal xerosis
III. Bitot's spots
IV. Conjunctival xerosis
(A) P-IV, Q-III, R-II, S-I
(B) P-III, Q-IV, R-I, S-II
(C) P-IV, Q-II, R-III, S-I
(D) P-II, Q-III, R-IV, S-I

127. Given below are two statements:
Statement I: Under the National Prophylaxis Programme in India, infants are given a first dose of 100,000 IU of Vitamin A at 9 months of age along with the measles vaccine.
Statement II: Subsequent doses of 200,000 IU are given every 6 months until the child reaches 5 years of age.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

128. Arrange the ocular manifestations of Vitamin A deficiency in the correct order of clinical progression (from earliest/mildest to most severe):
I. Keratomalacia
II. Night blindness (Nyctalopia)
III. Bitot's spots
IV. Corneal xerosis
Which of the following represents the correct sequence?
(A) II, III, IV, I
(B) III, II, IV, I
(C) II, IV, III, I
(D) IV, II, III, I

129. Which of the following statements about iron absorption is incorrect?
(A) Heme iron is absorbed more efficiently than non-heme iron.
(B) Phytates and tannins strongly inhibit the absorption of heme iron.
(C) Vitamin C (ascorbic acid) significantly enhances the absorption of non-heme iron.
(D) Gastric acid aids in iron absorption by maintaining it in the ferrous (Fe^{2+}) state.

130. As a Food Safety Officer, how would you rapidly test the presence of iodine in a retail salt sample in the field using a standard spot testing kit?
(A) Add Benedict's chemical reagent and heat; a bright brick-red precipitate indicates iodine.
(B) Add nitric acid; a crimson red color indicates iodine.
(C) Add barium chloride; a white precipitate indicates iodine.
(D) Add starch solution and weak acid; a blue-purple color indicates iodine.

131. Which of the following is a correctly paired nutrient enhancer and the mineral whose absorption it promotes?
(A) Ascorbic acid - Iron
(B) Phytic acid - Zinc ions
(C) Oxalic acid - Calcium ions
(D) Tannins - Heme iron proteins

132. The concept of Retinol Binding Protein (RBP) is critical in assessing Vitamin A status. In a child with severe protein-energy malnutrition, Vitamin A supplementation may be ineffective initially because:
(A) The child completely lacks the necessary dietary fats needed to absorb Vitamin A in the gut.
(B) Free Vitamin A is rapidly excreted in large quantities through the urine due to renal dysfunction.
(C) Impaired RBP synthesis prevents

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vitamins

(B) Actively preserving lean body mass and completely preventing muscle wasting syndrome

(C) Effectively managing complex metabolic complications induced by antiretroviral drugs

(D) Ensuring adequate hydration and electrolyte balance during severe episodes of chronic diarrhea

150. What is the most appropriate dietary intervention for a patient with pre-dialysis Chronic Kidney Disease (CKD) presenting with hyperphosphatemia and secondary hyperparathyroidism?

(A) Encourage high consumption of calcium-dense dairy products and phosphorus-rich dark colas.

(B) Increase overall dietary protein intake to 1.5 g/kg/day to compensate for urinary albumin losses.

(C) Administer high pharmaceutical doses of active Vitamin D without monitoring serum calcium levels.

(D) Prescribe phosphate binders with meals and restrict dietary phosphorus.

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calcium and accumulates in bones, causing osteosclerosis and exostoses.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

108. Which of the following statements correctly describes the clinical presentation of "Genu Valgum" associated with endemic fluorosis?
(A) Outward bowing of lower limbs (bowlegs) seen primarily in geriatric populations
(B) Knock-knee deformity in youth from high fluoride and low calcium
(C) Extensive calcification of spinal ligaments resulting in a stiff "poker back"
(D) Symmetrical pitting, staining, and severe brown discoloration of dental enamel

109. Consider the following sources of fluoride exposure in humans:
1. Groundwater passing through fluoride-bearing rocks
2. Consumption of certain brands of black tea
3. Ingestion of fluoridated toothpaste by children
4. Consumption of iodine-fortified salt

Which of these are significant sources of fluoride exposure?
(A) 1, 2, and 3
(B) 1, 2, and 4
(C) 2, 3, and 4
(D) 1, 3, and 4

110. A 45-year-old male from a drought-prone district presents with stiffness in the neck and back, inability to bend, joint pain, and brownish chalky striations on his teeth. Based on these clinical features, what is the most likely environmental cause?
(A) Chronic arsenic toxicity
(B) Severe iodine deficiency
(C) Chronic fluoride toxicity
(D) Lead poisoning

111. Match the items in List I with those in List II:
List I: (Types of Fluorosis)
P. Dental Fluorosis
Q. Skeletal Fluorosis
R. Non-skeletal Fluorosis
S. Genu Valgum

List II: (Characteristic Signs)
I. Gastrointestinal complaints and muscular weakness
II. Knock-knee syndrome in youth
III. Mottling, pitting, and chalky white patches on teeth
IV. Osteosclerosis, calcification of ligaments, joint stiffness
(A) P-III, Q-IV, R-I, S-II
(B) P-III, Q-I, R-IV, S-II
(C) P-IV, Q-III, R-II, S-I
(D) P-II, Q-IV, R-I, S-III

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112. Given below are two statements:
Statement I: The Nalgonda technique is a defluoridation method developed by NEERI, India.
Statement II: The Nalgonda technique utilizes lime and alum to precipitate fluoride out of drinking water.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false but Statement II is true.
(D) Statement I is true but Statement II is false.

113. Which of the following correctly describes the cause-and-effect relationship in Iodine Deficiency Disorders (IDD)?
(A) Low iodine intake → Increased thyroid hormone synthesis → Decreased pituitary TSH release → Goitre
(B) Low iodine → Decreased T3/T4 → Increased TSH → Thyroid hyperplasia (Goitre)
(C) High iodine intake → Autoimmune destruction of follicular tissue → Chronic thyroid goitre
(D) Low iodine intake → Increased renal calcitonin secretion → Secondary parathyroid hyperplasia

114. Which of the following statements about dental fluorosis is incorrect?
(A) It affects only the teeth that are developing during the period of excessive fluoride intake.
(B) Once the teeth have erupted, high fluoride intake can no longer cause dental fluorosis.
(C) The mildest form presents as faint white lines or streaks on the tooth enamel.
(D) It is entirely reversible if the person moves to an area with low fluoride water.

115. As a public health official managing endemic fluorosis in a village, which combination of dietary

9. (D) Dietary cholesterol intake has a linear and highly significant impact on serum LDL levels in all individuals.
Dietary cholesterol does not have a linear, highly significant impact on serum low-density lipoprotein levels in all individuals due to compensatory mechanisms. Most people maintain cholesterol homeostasis by reducing endogenous synthesis when dietary intake increases. Other factors, including saturated and trans fat consumption, play a far more substantial role in determining overall circulating serum lipid levels.

10. (A) Low in saturated fat and sodium, zero trans fat, containing soluble fibre
A commercially manufactured food product can legally and scientifically justify a heart-healthy label if its composition aligns with recognized cardiovascular health standards. This includes being low in saturated fat and sodium, containing zero trans-fatty acids, and incorporating soluble fiber. These nutritional parameters collectively help maintain optimal blood pressure, reduce arterial plaque formation, and lower circulating low-density lipoprotein cholesterol.

11. (B) LDL - Major carrier of cholesterol to peripheral tissues
Low-density lipoprotein is the primary carrier responsible for transporting cholesterol from the liver to peripheral tissues. In contrast, chylomicrons transport dietary lipids from the intestine, very-low-density lipoproteins carry endogenous triglycerides from the liver, and high-density lipoprotein facilitates reverse cholesterol transport by delivering cholesterol from peripheral tissues back to the liver for excretion.

12. (B) High ratio of amylopectin to amylose
The glycaemic index of a meal is influenced by the structure of starch. Amylose has a linear, tightly packed structure that resists rapid enzymatic digestion, lowering the glycaemic response. Conversely, amylopectin is highly branched and easily hydrolyzed, raising the glycaemic index. Intact cell walls, viscous soluble fibers, and organic acids delay digestion, reducing the overall postprandial glucose spike.

13. (A) Mustard oil - Eicosapentaenoic acid
Eicosapentaenoic acid is a long-chain omega-3 polyunsaturated fatty acid found almost exclusively in marine sources like fatty fish, not in plant-based oils. Mustard oil is characterized by a high concentration of monounsaturated fatty acids, particularly erucic acid and oleic acid, along with alpha-linolenic acid, which is a precursor to longer-chain omega-3 fatty acids.

14. (C) High dietary intake of anthocyanins
Anthocyanins are bioactive flavonoid pigments found in dark-colored fruits and vegetables that exert strong antioxidant and anti-inflammatory properties, thereby protecting against cardiovascular diseases. On the contrary, high intake of saturated palmitic acid, excessive consumption of added sugars, and a high sodium-to-potassium ratio are established dietary risk factors that actively promote arterial inflammation, hypertension, and atherosclerosis.

15. (D) Increase intake of viscous soluble fibres and phytosterols from plants
To effectively manage severe hypercholesterolemia and reduce cardiovascular risk, increasing the consumption of viscous soluble fibers and plant phytosterols is highly recommended. Soluble fibers bind bile acids to promote excretion, while phytosterols competitively block cholesterol absorption in the gut. Extremely high-saturated-fat ketogenic diets or complete fat elimination are unsustainable and potentially harmful to cardiovascular health.

16. (C) Achieve and maintain optimal blood glucose, lipid, and blood pressure levels
The primary dietary goal in managing type 2 diabetes is to achieve and maintain optimal glycaemic control, lipid profiles, and blood pressure levels. This comprehensive management plan reduces the risk of macrovascular and microvascular complications. Rather than completely eliminating carbohydrates, clinical guidelines emphasize managing carbohydrate portions, selecting high-fiber sources, and maintaining a balanced, nutrient-dense diet.

17. (A) Both A and R are true and R is the correct explanation of A.
Central obesity is a critical driver for the development of type 2 diabetes. Excess visceral adipose tissue is highly metabolically active and releases large amounts of free fatty acids and pro-inflammatory adipokines into the portal circulation. These circulating substances directly impair insulin signaling pathways in skeletal muscle and hepatic tissues, leading to systemic insulin resistance and hyperglycemia.

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II. Gluten
III. Potassium and Fluid
IV. Aromatic Amino Acids (standard protein)
(A) P-III, Q-IV, R-I, S-II
(B) P-IV, Q-III, R-II, S-I
(C) P-III, Q-I, R-IV, S-II
(D) P-I, Q-IV, R-III, S-II

142. Given below are two statements:
Statement I: Patients living with HIV/AIDS (PLHIV) require 10-30% more energy intake depending on the stage of the disease and opportunistic infections.
Statement II: Protein requirements for PLHIV are reduced to prevent renal strain caused by antiretroviral therapy.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is false but Statement II is true.
(D) Statement I is true but Statement II is false.

143. Which of the following represents the correct cause-and-effect relationship between tuberculosis (TB) treatment and nutritional status?
(A) Rifampicin therapy → Direct destruction of gut flora → Severe acute Vitamin K toxic reaction
(B) Ethambutol therapy → Chronic depletion of tissue Vitamin C → Accelerated clinical scurvy
(C) Pyrazinamide therapy → Extremely enhanced intestinal iron absorption → Hemochromatosis
(D) Isoniazid therapy → Pyridoxine (Vitamin B_6) interference → Neuropathy

144. Which of the following statements about nutrition therapy in tuberculosis (TB) patients is incorrect?
(A) TB leads to severe muscle wasting, necessitating a high-protein diet.
(B) Micronutrient supplementation (e.g., Vitamin A, zinc, iron) helps improve immune recovery.
(C) Energy requirements are decreased due to the lethargy associated with the disease.
(D) Poor nutritional status increases the risk of progression from latent to active TB.

145. As a clinical dietitian or FSO evaluating a specialized enteral formula for a patient with end-stage renal disease on hemodialysis, which profile is most appropriate?
(A) Low protein, low potassium, low phosphorus, standard therapeutic fluid volume
(B) High protein, low potassium and phosphorus, fluid-restricted
(C) High protein, high potassium, high fluid volume with minimal caloric enhancement
(D) Low protein, high sodium, low calorie density with added simple carbohydrates

146. Which of the following is a correctly paired hepatic disorder and its recommended dietary modification?
(A) Uncomplicated Hepatitis - Severe restriction of all dietary proteins to protect cells
(B) Ascites - Exceptionally high sodium intake designed to maintain systemic blood pressure
(C) Hepatic encephalopathy - High therapeutic intake of aromatic amino acids in the diet
(D) Steatosis (Fatty Liver) - Weight loss and restricted simple sugars/alcohol

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147. The concept of using Branched-Chain Amino Acids (BCAAs) in the dietary management of hepatic encephalopathy is based on the premise that:
(A) BCAAs compete with aromatic amino acids at the blood-brain barrier.
(B) BCAAs are exclusively metabolized in liver tissues, forcing rapid cellular regeneration.
(C) BCAAs bind directly to toxic ammonia in the gut lumen, completely preventing its absorption.
(D) BCAAs strongly inhibit the active urea cycle, significantly reducing blood urea nitrogen levels.

148. Identify the incorrect pair regarding Antiretroviral Therapy (ART) side effects in HIV/AIDS and their nutritional impact.
(A) Lipodystrophy - Peripheral fat redistribution and metabolic syndrome development
(B) Zidovudine (AZT) - Chronic microcytic anemia requiring active iron/B12 monitoring
(C) Nevirapine - Calcium depletion and rickets
(D) Protease inhibitors - Prominent hyperlipidemia and peripheral insulin resistance

149. Which of the following is NOT a primary goal of nutritional therapy in HIV/AIDS?
(A) Eradicating viral load via mega-dosing

27. (B) A molar ratio of sodium to potassium close to 1:1 or lower
An optimal diet for preventing and managing hypertension should maintain a low sodium-to-potassium molar ratio, ideally close to 1:1 or even lower. High potassium intake enhances urinary sodium excretion and promotes vascular smooth muscle relaxation, directly counteracting the vasoconstrictive effects of sodium. Modern processed diets typically feature high sodium-to-potassium ratios, which significantly elevate cardiovascular disease risk.

28. (B) Saccharin - High-calorie sweetener, causing severe hyperglycemia
Saccharin is an artificial, non-nutritive sweetener that is completely calorie-free and does not elevate blood glucose levels or cause hyperglycemia, making it suitable for diabetic diets. Other sweeteners have specific properties: aspartame contains phenylalanine and is contraindicated for individuals with phenylketonuria, while sucralose is a highly heat-stable, chlorinated sucrose derivative widely used in baking.

29. (A) Licorice root extract with glycyrrhizin
Licorice root contains glycyrrhizin, a compound that inhibits the enzyme 11-beta-hydroxysteroid dehydrogenase type 2. This inhibition leads to cortisol accumulation, which stimulates mineralocorticoid receptors, causing sodium retention, potassium depletion, and severe hypertension. In contrast, dietary nitrates from leafy greens, calcium-rich low-fat dairy, and omega-3 fatty acids from marine fish support vasodilation and help reduce blood pressure.

30. (C) Achieving 5-10% weight loss via balanced hypocaloric diet and moderate exercise
For individuals diagnosed with prediabetes, achieving a modest weight loss of five to ten percent through a balanced hypocaloric diet and regular moderate-intensity physical activity is the most effective and sustainable lifestyle intervention. This approach significantly enhances peripheral insulin sensitivity, reduces hepatic glucose output, and effectively prevents or delays the clinical progression to type 2 diabetes.

31. (B) Less than 5 grams per day
The World Health Organization recommends that adults consume less than five grams of salt per day, which is equivalent to approximately two grams of sodium. Restricting daily salt intake to this level helps lower blood pressure, reduces the risk of stroke and coronary heart disease, and mitigates the global burden of cardiovascular non-communicable diseases.

32. (A) Both A and R are true and R is the correct explanation of A.
Most individuals with simple obesity present with high circulating levels of leptin rather than a deficiency. This occurs because leptin is secreted by adipose tissue in proportion to fat mass. However, obesity is characterized by central leptin resistance, where transport across the blood-brain barrier or intracellular signaling is impaired, preventing leptin from promoting satiety.

33. (B) Obese individuals typically have a higher absolute BMR due to increased lean mass supporting excess weight.
Although adipose tissue has low metabolic activity, obese individuals generally possess a higher absolute basal metabolic rate than lean individuals. This is primarily because carrying excess body weight requires a concurrent increase in supportive lean body mass, such as muscle and connective tissue, which significantly elevates the overall energy required to maintain basic physiological functions.

34. (A) 1, 3, and 4
Obesity is a complex condition driven by an obesogenic environment that encourages high calorie intake, coupled with poor sleep patterns that disrupt appetite-regulating hormones. High-fructose corn syrup also promotes de novo lipogenesis. While single-gene mutations like the MC4R gene cause severe early-onset obesity, they account for only a small fraction of common polygenic obesity cases.

35. (B) Obesity Class I
The Body Mass Index is calculated by dividing body weight in kilograms by the square of height in meters. A weight of eighty-five kilograms and a height of one point six meters yields a value of approximately thirty-three point two. According to World Health Organization criteria, a value within this range classifies the individual under obesity class one.

36. (A) P-II, Q-I, R-IV, S-III
Appetite is regulated by several key hormones. Ghrelin is produced by the stomach and acts as an orexigenic signal to stimulate appetite. Leptin

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is secreted by adipose tissue to signal long-term energy stores. Cholecystokinin is released from the duodenum to stimulate gallbladder contraction and induce short-term satiety, while GLP-1 from intestinal L-cells enhances glucose-dependent insulin secretion.

37. (C) Statement I is true but Statement II is false.
The satiety index measures a food's ability to satisfy hunger and reduce subsequent food intake. However, foods rich in protein, water, and dietary fiber possess a significantly higher satiety index than high-fat, low-fiber, energy-dense foods. Fiber and protein delay gastric emptying and trigger satiety hormones, making them more effective at suppressing hunger over longer periods.

38. (A) IV, II, III, I
The clinical management of severe obesity follows a structured, stepped-care pathway based on patient risk and intervention invasiveness. The sequence begins with routine primary care screening and body mass index assessment. If indicated, this is followed by comprehensive lifestyle modifications, then the introduction of prescription anti-obesity pharmacotherapy, and finally, evaluation for bariatric surgery.

39. (B) They are safe for long-term use without medical supervision.
Very low-calorie diets provide between four hundred and eight hundred kilocalories per day using formulated liquid meals to maintain micronutrient adequacy during rapid weight loss. Because these diets severely restrict energy, they carry risks like gallstone formation and electrolyte imbalances, making them unsafe for long-term use and strictly requiring close clinical and medical supervision.

40. (C) Encouraging high water and fibre foods like soups and vegetables
Modifying dietary energy density involves consuming foods that provide fewer calories per gram of food weight. Encouraging the intake of foods with high water and fiber content, such as vegetable-based soups, fresh fruits, and vegetables, allows individuals to consume a satisfying volume of food while significantly reducing total energy intake, supporting sustainable weight management.

41. (D) TNF-α - Impairs insulin signalling pathways in adipocytes and muscle
Tumor necrosis factor-alpha is a pro-inflammatory cytokine secreted by macrophages in expanding adipose tissue. It directly impairs insulin receptor substrate-1 phosphorylation, disrupting insulin signaling pathways in adipocytes and skeletal muscle, contributing to systemic insulin resistance. Conversely, adiponectin enhances insulin sensitivity, and leptin acts centrally to suppress food intake during positive energy balance states.

42. (A) Fats
Dietary energy density refers to the amount of energy provided per unit weight of a food. Among all macronutrients, dietary fats have the highest energy density, yielding nine kilocalories per gram. In contrast, carbohydrates and proteins provide approximately four kilocalories per gram, while soluble and insoluble dietary fibers contribute minimal digestible energy to the body.

43. (C) High risk waist circumference (Men) - $\geq$ 102 cm
For Asian Indian populations, anthropometric cutoffs are lower due to a higher predisposition to visceral adiposity and metabolic syndrome at lower body weights. The normal body mass index range is eighteen point five to twenty-two point nine, and the high-risk waist circumference threshold is defined as ninety centimeters or greater for men, and eighty centimeters or greater for women.

44. (B) Enhanced production of anti-inflammatory cytokines
Central adiposity is characterized by visceral fat expansion, which promotes a chronic, low-grade inflammatory state. This results in the decreased production of anti-inflammatory adipokines like adiponectin, alongside increased secretion of pro-inflammatory cytokines, hyperinsulinemia, and elevated portal free fatty acid flux. These free fatty acids accumulate ectopically in the liver, contributing to non-alcoholic fatty liver disease.

45. (A) A personalized energy deficit of 500-750 kcal/day with balanced macronutrients
The most sustainable and effective dietary strategy for long-term weight loss in obese individuals is a personalized energy deficit of five hundred to seven hundred and fifty kilocalories per day, utilizing balanced macronutrients. This gradual restriction preserves lean muscle mass, prevents

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severe metabolic adaptation, and is easier to maintain compared to extreme, unsupervised, or highly restrictive fad diets.

46. (C) Central obesity
According to the International Diabetes Federation diagnostic criteria, central obesity, assessed by population-specific waist circumference thresholds, is a mandatory prerequisite for diagnosing metabolic syndrome. In addition to central obesity, a patient must present with any two of four other risk factors: elevated triglycerides, reduced high-density lipoprotein cholesterol, elevated blood pressure, or increased fasting plasma glucose levels.

47. (A) Both A and R are true and R is the correct explanation of A.
Insulin resistance is a central pathophysiological mechanism driving metabolic syndrome. When tissues become resistant to insulin, glucose uptake in skeletal muscle is severely impaired. Simultaneously, the normal inhibitory effects of insulin on hepatic glucose production and adipose tissue lipolysis are lost, leading to increased circulating blood glucose and a continuous flux of free fatty acids.

48. (C) Increased hepatic synthesis of VLDL due to excess free fatty acid flux
The metabolic abnormalities of metabolic syndrome include increased hepatic synthesis of very-low-density lipoproteins, driven by an excessive flux of free fatty acids to the liver. This state is characterized by elevated plasma triglycerides, decreased cardioprotective high-density lipoprotein cholesterol, and increased levels of plasminogen activator inhibitor-1, which promotes a prothrombotic state and elevates cardiovascular risk.

49. (A) 1, 2, and 4
Metabolic syndrome is clinically defined by a cluster of cardiovascular risk factors. These include fasting triglycerides of one hundred and fifty milligrams per deciliter or higher, blood pressure readings of one hundred and thirty over eighty-five millimeters of mercury or higher, and fasting plasma glucose of one hundred milligrams per deciliter or higher. High-density lipoprotein is a risk factor when reduced, not elevated.

50. (D) Metabolic Syndrome
The patient meets the diagnostic criteria for metabolic syndrome as defined by multiple international bodies. He presents with central obesity indicated by an elevated waist circumference, high blood pressure, elevated fasting glucose, high serum triglycerides, and low high-density lipoprotein cholesterol. These clustering metabolic abnormalities significantly increase his risk of developing type 2 diabetes and clinical cardiovascular disease.

51. (A) P-III, Q-IV, R-I, S-II
Dietary factors influence cancer through various mechanisms. Aflatoxin B1 undergoes hepatic biotransformation to form highly reactive DNA adducts. Dietary fiber dilutes fecal carcinogens and decreases intestinal transit time. Saturated fat acts as a promoter by increasing the secretion of secondary bile acids in the colon. Vitamin C functions as an antioxidant, scavenging free radicals to inhibit initiation.

52. (C) Statement I is false but Statement II is true.
Epigenetic modifications induced by dietary bioactive compounds generally protect against cancer by reactivating silenced tumor suppressor genes or silencing oncogenes. Dietary factors like folate, choline, and methionine act as methyl donors, directly influencing DNA methyltransferase activity and chromatin structure. Consequently, stating that dietary compounds cause cancer by silencing tumor suppressor genes is scientifically inaccurate.

53. (A) High fat intake → Increased primary bile acids → Bacterial conversion to secondary bile acids → Colon mucosal hyperproliferation
Chronic high-fat diets promote colon carcinogenesis by stimulating the synthesis and secretion of primary bile acids into the duodenum. In the colon, anaerobic bacteria metabolize these compounds into secondary bile acids, such as deoxycholic acid. These secondary bile acids act as cellular toxins that induce mucosal inflammation, oxidative stress, and subsequent hyperproliferation of colon epithelial stem cells.

54. (D) Endogenous enzymes like SOD form hydroxyl radicals to destroy cancer cells.
Endogenous antioxidant enzymes like superoxide dismutase do not form highly reactive hydroxyl radicals to destroy cancer cells; instead, they convert superoxide anions into hydrogen peroxide,

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73. (D) Fermentation of dairy - N-nitrosamines
The fermentation of dairy products by lactic acid bacteria is not associated with the formation of carcinogenic N-nitrosamines; instead, it is a safe preservation method that can yield beneficial probiotics. In contrast, smoking meats deposits polycyclic aromatic hydrocarbons, high-temperature pan-frying forms heterocyclic amines in muscle tissue, and deep-frying carbohydrate-rich foods produces acrylamide through the Maillard reaction.

74. (A) Trans fats
Trans-fatty acids do not protect against oxidative stress or carcinogenesis; rather, they are pro-inflammatory compounds that promote systemic oxidative stress, endothelial dysfunction, and chronic disease. Conversely, lutein, selenium, and cryptoxanthin are beneficial dietary components that serve as antioxidants or cofactors for antioxidant enzymes, helping to neutralize free radicals and protect cellular DNA from damage.

75. (B) Braising at lower temperatures
Braising at lower temperatures in the presence of moisture is the safest method to minimize the formation of heterocyclic amines and polycyclic aromatic hydrocarbons. These process-induced carcinogens are generated during high-heat dry cooking, such as charcoal grilling or pan-frying. Moist cooking methods keep temperatures lower, preventing the chemical reactions that form these mutagens in muscle tissue.

76. (B) Aspergillus flavus
Aspergillus flavus is the primary fungal species responsible for producing aflatoxins, which are highly toxic and carcinogenic mycotoxins. This mold commonly contaminates agricultural crops such as peanuts, maize, and tree nuts under warm, humid conditions during growth, harvesting, or storage. Other fungal species like Fusarium or Penicillium produce different mycotoxins, such as fumonisins and patulin.

77. (A) Both A and R are true and R is the correct explanation of A.
Dietary exposure to Aflatoxin B1 is a major cause of hepatocellular carcinoma. Once ingested, Aflatoxin B1 is metabolized in the liver by cytochrome P450 enzymes into a highly reactive intermediate, aflatoxin-8,9-epoxide. This intermediate binds to genomic DNA, forming covalent adducts that induce a specific G-to-T transversion mutation in codon 249 of the p53 tumor suppressor gene.

78. (C) High moisture and warm storage temperatures promote Aspergillus growth and aflatoxin synthesis.
The growth of Aspergillus fungi and the subsequent synthesis of aflatoxins are highly favored by elevated moisture levels in crops and warm storage temperatures. Preventing fungal contamination requires post-harvest drying to reduce moisture content and maintaining cool, dry, well-ventilated storage environments, which effectively halts fungal proliferation and prevents the accumulation of these dangerous mycotoxins.

79. (A) 1, 3, and 4
Acrylamide formation occurs during high-temperature cooking, typically above one hundred and twenty degrees Celsius, under low moisture conditions. The reaction requires the presence of the free amino acid asparagine and reducing sugars like glucose or fructose, which undergo the Maillard browning reaction. High-moisture boiling suppresses this reaction, preventing the generation of acrylamide.

80. (C) Liver cancer
Groundnuts stored under high-humidity conditions are highly susceptible to contamination by Aspergillus flavus, which produces potent aflatoxins. Long-term consumption of these contaminated nuts leads to chronic aflatoxicity. In the liver, aflatoxins form DNA adducts that mutate tumor suppressor genes, significantly increasing the risk of developing hepatocellular carcinoma, especially in individuals with hepatitis B infection.

81. (A) P-II, Q-I, R-IV, S-III
Process-induced carcinogens contaminate specific food items depending on preparation methods. Acrylamide forms in fried potato crisps via the Maillard reaction. Aflatoxin M1, a metabolite of aflatoxin B1, is found in milk from cows fed contaminated feed. Heterocyclic amines form in grilled chicken muscle tissue, and polycyclic aromatic hydrocarbons are deposited on the surface of charbroiled burgers.

82. (C) Statement I is false but Statement II is true.
Acrylamide is not naturally present in raw potatoes or green coffee beans; instead, it is a process-induced chemical contaminant. It forms

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enzymes conjugate reactive carcinogens, rendering them water-soluble and facilitating their rapid excretion from the body, thereby preventing them from interacting with cellular DNA and initiating tumor development.

64. (A) 1, 2, and 4
Lycopene is associated with reduced prostate cancer risk, glucosinolates are metabolized to bioactive isothiocyanates, and green tea epigallocatechin gallate inhibits angiogenesis. Conversely, high dietary calcium intake is associated with a decreased risk of colorectal cancer, as calcium binds to free bile acids and fatty acids in the intestinal lumen, reducing their irritating and carcinogenic effects.

65. (B) N-nitrosamines
The consumption of processed meats containing sodium nitrite poses a health risk because, in the acidic environment of the stomach, nitrites readily react with secondary and tertiary amines derived from protein digestion. This chemical reaction forms N-nitrosamines, which are highly carcinogenic compounds that can induce DNA alkylation and increase the risk of gastric and colorectal cancers.

66. (A) P-II, Q-IV, R-I, S-III
Phytochemicals are distributed across various plant sources. Anthocyanins are abundant in berries and red grapes, while resveratrol is found in red grape skins and red wine. Allicin is the primary organosulfur compound in garlic and onions, and isoflavones are phytoestrogens concentrated in soybeans. Consuming these diverse food sources provides a wide range of protective bioactive compounds.

67. (A) Both Statement I and Statement II are true.
High consumption of red meat is classified as probably carcinogenic to humans. This association is supported by mechanistic evidence showing that heme iron, abundant in red meat, catalyzes the formation of highly reactive oxygen species and carcinogenic N-nitroso compounds in the gastrointestinal tract. These compounds damage the colonic mucosa, promoting cell hyperproliferation and colorectal carcinogenesis.

68. (A) II, I, IV, III
Carcinogenesis from processed meats involves a sequence of chemical reactions. First, sodium nitrite is added to meat for preservation. Upon ingestion, these nitrites interact with secondary amines in the acidic gastric environment to form nitrous acid. This leads to the formation of N-nitrosamines, which ultimately react with cellular DNA to produce mutagenic adducts that initiate cancer.

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69. (A) Boiling extensively maximizes their anti-cancer properties.
Extensive boiling does not maximize the anti-cancer properties of cruciferous vegetables; instead, it heat-denatures the enzyme myrosinase and leaches water-soluble glucosinolates, significantly reducing their bioactive potential. To preserve these cancer-protective compounds, gentle cooking methods such as steaming, microwaving, or stir-frying are recommended, as they keep the enzyme active and minimize nutrient loss.

70. (D) Sodium nitrite/nitrate limits
Food safety regulations strictly limit the concentration of sodium nitrite and nitrate used in cured and processed meats. Monitoring these chemical preservatives is essential because excessive amounts can form carcinogenic N-nitroso compounds in the stomach. Maintaining these additives within safe, legally permitted thresholds is a critical measure to minimize the risk of diet-related gastrointestinal cancers.

71. (B) Vitamin E - Protects lipid membranes from lipid peroxidation
Vitamin E is a fat-soluble antioxidant that localizes within lipophilic cell membranes and lipoprotein particles. It acts as a primary peroxyl radical scavenger, protecting polyunsaturated fatty acids from undergoing chain-propagating lipid peroxidation. On the other hand, Vitamin C is water-soluble and primarily functions in aqueous environments, such as the cytoplasm and extracellular fluid.

72. (C) Antioxidants like Vitamin C can regenerate oxidized Vitamin E, working cooperatively.
The concept of antioxidant synergy refers to the cooperative interaction between different cellular antioxidants. For example, when fat-soluble Vitamin E neutralizes a lipid radical in the cell membrane, it becomes oxidized. Water-soluble Vitamin C, located in the adjacent aqueous phase, can reduce the oxidized Vitamin E back to its active form, maintaining continuous cellular antioxidant protection.

protecting cells from oxidative damage. Chronic oxidative stress can damage cellular DNA, forming carcinogenic adducts. Standard dietary antioxidants protect cells by directly donating stable electrons to neutralize circulating free radicals.

55. (B) Fortification with high-fructose corn syrup and hydrogenated oils
A food product containing high-fructose corn syrup and hydrogenated oils cannot prevent metabolic syndrome. High-fructose corn syrup stimulates hepatic de novo lipogenesis, raising triglycerides and promoting visceral adiposity. Hydrogenated oils contain trans-fatty acids that raise low-density lipoprotein cholesterol, lower high-density lipoprotein, and promote systemic inflammation, directly worsening the key clinical features of metabolic syndrome.

56. (C) Nitrosamines - Cured and processed meats
Cured and processed meats are a primary dietary source of preformed nitrosamines and their precursors, such as sodium nitrite. In contrast, heterocyclic amines are formed during high-temperature cooking of muscle meats, acrylamide is generated in fried or baked carbohydrate-rich foods, and benzopyrene, a polycyclic aromatic hydrocarbon, is typically produced during the smoking or charcoal-grilling of meats.

57. (D) Inhibiting new blood vessel formation supplying the tumor
Dietary angiogenesis inhibition is a protective mechanism where specific bioactive compounds in foods, such as epigallocatechin gallate in green tea, prevent the formation of new blood vessels. Since growing tumors require a dedicated blood supply to obtain oxygen and nutrients for survival and metastasis, blocking this vascular development effectively starves the tumor and limits its growth.

58. (A) HDL cholesterol (Men) - $\geq$ 50 mg/dL
According to the International Diabetes Federation criteria for South Asian populations, the diagnostic threshold for reduced high-density lipoprotein cholesterol in men is less than forty milligrams per deciliter, not fifty. For women, the threshold is less than fifty milligrams per deciliter. The other criteria, including fasting glucose, blood pressure, and triglycerides, are correctly paired with their thresholds.

59. (B) Intake of insoluble fibre
Insoluble dietary fiber intake is not a risk factor for metabolic syndrome; rather, it is a protective dietary component that improves insulin sensitivity, promotes satiety, and supports gastrointestinal health. Conversely, a highly sedentary lifestyle, excessive consumption of refined simple sugars, and inherited polygenic genetic predispositions are established risk factors that actively promote the development of metabolic syndrome.

60. (B) Mediterranean diet rich in MUFAs, whole grains, and omega-3s
The Mediterranean diet is the most recommended dietary pattern for managing and reversing metabolic syndrome. It is naturally rich in monounsaturated fatty acids, particularly from olive oil, whole grains, vegetables, fruits, and omega-3 fatty acids from fish. This nutrient profile reduces systemic inflammation, improves insulin sensitivity, and optimizes lipid ratios compared to Western or highly restrictive diets.

61. (A) Vitamin C, Vitamin E, Beta-carotene
Vitamin C, Vitamin E, and beta-carotene are the primary dietary antioxidants that protect cells from oxidative stress. Vitamin C is water-soluble and scavenges free radicals in aqueous compartments, while Vitamin E is fat-soluble and prevents lipid peroxidation in cell membranes. Beta-carotene acts within lipophilic environments to quench singlet oxygen, collectively reducing oxidative damage to cellular components.

62. (A) Both A and R are true and R is the correct explanation of A.
High dietary fiber intake is inversely associated with colorectal cancer risk. In the large intestine, anaerobic gut microbiota ferment soluble fiber to produce short-chain fatty acids, primarily butyrate. Butyrate acts as an epigenetic regulator, inhibiting histone deacetylases, which blocks cell proliferation and induces apoptosis in cancerous colonocytes while serving as an energy source for normal colonocytes.

63. (D) They induce Phase II enzymes like glutathione S-transferase, facilitating carcinogen excretion
Dietary phytochemicals protect against carcinogenesis by modulating endogenous enzyme systems. Many active compounds induce Phase II detoxification enzymes, such as glutathione S-transferase and quinone reductase. These

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during high-temperature processing methods like baking, roasting, or frying through the Maillard reaction, where the amino acid asparagine reacts with reducing sugars. Therefore, raw agricultural commodities do not contain measurable quantities of this contaminant.

83. (A) High heat cooking → Reaction of creatine, amino acids, and sugars → HCAs in muscle meats
The formation of heterocyclic amines is a temperature-dependent process that occurs during high-heat cooking of muscle meats. Under intense heat, free amino acids, sugars, and creatine or creatinine present in skeletal muscle tissue undergo complex chemical reactions. This pathway generates mutagenic heterocyclic amines, which are not produced during low-temperature boiling or traditional food fermentation.

84. (C) They are abundantly formed in grilled vegetables and tofu.
Heterocyclic amines are not formed in grilled vegetables or tofu because these plant-based foods lack creatine and creatinine, which are essential precursors for their chemical synthesis. Instead, heterocyclic amines are process-induced carcinogens formed exclusively in skeletal muscle meats during high-heat dry cooking. Marinating meats and cooking at lower temperatures are effective ways to reduce their formation.

85. (A) Add asparaginase before baking
To mitigate acrylamide formation in baked goods, manufacturers can add the enzyme asparaginase to dough prior to baking. Asparaginase converts the free amino acid asparagine into aspartic acid, effectively removing a key precursor required for acrylamide synthesis through the Maillard reaction. Increasing baking temperatures or substituting sucrose with reducing sugars would instead accelerate acrylamide formation.

86. (D) Liver
Aflatoxin B1 is a potent, hepatotoxic mycotoxin that primarily targets the liver, where it is metabolized into a highly reactive mutagenic epoxide that induces hepatocellular carcinoma. Conversely, beta-ODAP is a neurotoxin affecting the motor nervous system, sanguinarine targets blood capillaries causing systemic edema, and acrylamide is a neurotoxin and suspected carcinogen with systemic rather than pancreatic-specific toxicity.

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87. (B) Asparagine
Asparagine is the primary amino acid precursor involved in the formation of acrylamide in carbohydrate-rich foods. During high-temperature cooking, such as baking, frying, or roasting, the free amino group of asparagine reacts with the carbonyl group of reducing sugars like glucose in the Maillard reaction cascade, leading to the thermal generation of acrylamide.

88. (C) Aflatoxin - Claviceps purpurea
Aflatoxins are produced by Aspergillus species, primarily Aspergillus flavus and Aspergillus parasiticus, not by Claviceps purpurea. Claviceps purpurea is a plant pathogen responsible for producing ergot alkaloids in cereal crops like rye. The other pairs, including ochratoxin A, patulin, and fumonisins with their respective producing fungal species, are correctly matched.

89. (D) Cooking meat to a very well-done state to ensure food safety
Cooking meat to a very well-done state is not a recommended method to reduce heterocyclic amines; instead, prolonged exposure to high heat significantly increases the concentration of these process-induced carcinogens. To minimize their formation, safe strategies include pre-cooking meat in a microwave to reduce grilling time, flipping meat frequently, and using antioxidant-rich marinades.

90. (A) Controlling insects and drought
The most effective pre-harvest strategy to prevent aflatoxin contamination in crops is controlling insect damage and managing drought stress. Insects create physical entry wounds in developing plants, facilitating fungal entry, while drought weakens plant defenses, making them more susceptible to Aspergillus colonization. Managing these agricultural factors significantly reduces fungal growth and mycotoxin accumulation before harvest.

91. (B) Argemone mexicana
Epidemic dropsy is a clinical toxicological condition caused by consuming mustard oil adulterated with the seeds or oil of Argemone mexicana, also known as prickly poppy. Argemone seeds closely resemble mustard seeds, making accidental or intentional adulteration common during harvesting or processing. Consuming this adulterated oil introduces toxic alkaloids that damage human vascular capillaries.

92. (A) Both A and R are true and R is the correct explanation of A.
Epidemic dropsy is characterized by bilateral pitting edema of the lower limbs. This is caused by the active alkaloid sanguinarine, found in argemone oil. Sanguinarine inhibits cellular Na+/K+-ATPase and stimulates the release of inflammatory mediators, leading to capillary dilatation, increased vascular permeability, and fluid leakage into interstitial tissues, resulting in non-inflammatory edema.

93. (A) The nitric acid test yields a crimson red color.
The presence of argemone oil in mustard oil can be detected using the nitric acid test. Adding concentrated nitric acid to the adulterated oil sample and heating it gently results in the development of a distinct crimson red color in the acid layer. This color change is due to the reaction of nitric acid with sanguinarine.

94. (A) 1, 2, and 4
Epidemic dropsy presents with characteristic clinical features including bilateral pitting edema of the lower limbs, cardiovascular complications, glaucoma due to increased ocular pressure, and skin erythema or mottling. Spastic paraplegia and a scissor-like gait are not symptoms of epidemic dropsy; instead, they are classic clinical neurological signs of neurolathyrism caused by consuming Khesari dal.

95. (D) Sanguinarine
The sudden outbreak of lower limb swelling, diarrhea, and skin erythema after consuming contaminated mustard oil indicates epidemic dropsy. This condition is caused by sanguinarine, the primary toxic alkaloid present in argemone oil used as an adulterant. Other toxins like beta-ODAP cause spastic paralysis, while aflatoxins are hepatotoxic and do not produce acute capillary leakage.

96. (A) P-II, Q-IV, R-I, S-III
Naturally occurring toxins are linked to specific clinical conditions. Sanguinarine from argemone oil causes epidemic dropsy, while beta-ODAP in Lathyrus sativus leads to neurolathyrism. Pyrrolizidine alkaloids from contaminated grains cause hepatic veno-occlusive disease, and chronic exposure to aflatoxins from contaminated crops is a major cause of hepatocellular carcinoma.

97. (A) Both Statement I and Statement II are true.
Neurolathyrism is an irreversible, non-progressive spastic paralysis of the lower limbs. It is caused by chronic consumption of Lathyrus sativus, which contains the neurotoxin beta-ODAP. This compound acts as a structural analogue of glutamate, overstimulating AMPA receptors in the spinal cord, leading to excitotoxicity and the selective death of upper motor neurons.

98. (A) II, IV, I, III
The traditional steeping method to detoxify Khesari dal involves a specific sequence of steps to leach out the water-soluble neurotoxin beta-ODAP. First, the seeds are boiled in large quantities of water. Next, they are soaked in hot water for a couple of hours. The water is then drained, and finally, the seeds are sun-dried before consumption.

99. (A) It causes sensory loss and intellectual impairment in addition to motor paralysis.
Neurolathyrism is characterized strictly by motor system deficits, presenting as spastic muscle rigidity and paralysis of the lower limbs. It does not cause sensory loss, cognitive decline, or intellectual impairment. The condition typically affects young males and develops after prolonged, exclusive consumption of Lathyrus sativus, but can be prevented by parboiling or steeping the seeds.

100. (C) Nitric acid test
The nitric acid test is a rapid, reliable spot test used to screen for the adulteration of edible oils with argemone oil. When concentrated nitric acid is added to the suspected oil sample, the presence of the alkaloid sanguinarine causes a chemical reaction that produces a distinct red color, confirming the presence of the adulterant.

101. (A) Metanil yellow in turmeric - Hydrochloric acid test
Metanil yellow, a prohibited synthetic dye used to adulterate turmeric, can be detected using the hydrochloric acid test, which produces a magenta-red color. Conversely, argemone oil is detected using nitric acid rather than the Baudouin test, and starch in milk is identified using iodine, which produces a characteristic blue-black color upon reaction.

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102. (D) Glutamate receptors
The neurotoxin beta-ODAP causes neurolathyrism through excitotoxicity, a mechanism involving the overstimulation of excitatory glutamate receptors, specifically AMPA-type receptors, in the central nervous system. This continuous activation triggers excessive calcium influx into neurons, initiating an intracellular cascade that leads to oxidative stress, mitochondrial dysfunction, and the selective degeneration of motor neurons.

103. (B) Sanguinarine - Soybean
Sanguinarine is a toxic benzophenanthridine alkaloid derived from the seeds of Argemone mexicana, not from soybeans. Soybeans contain beneficial proteins and isoflavones. The other pairs, including solanine in green potatoes, beta-ODAP in Lathyrus sativus, and cyanogenic glycosides in raw cassava roots, are correctly matched with their respective natural plant sources.

104. (C) Flaccid paralysis
Neurolathyrism specifically damages upper motor neurons, presenting as spastic paralysis, lower limb muscle rigidity, exaggerated deep tendon reflexes, and a scissor-like gait. Flaccid paralysis is characteristic of lower motor neuron lesions or acute toxicities like botulism, and is not a clinical symptom observed in patients suffering from neurolathyrism.

105. (D) Cultivating toxin-free Lathyrus sativus varieties
The most effective, sustainable long-term strategy to eliminate lathyrism is cultivating low-toxin or toxin-free varieties of Lathyrus sativus developed through selective plant breeding. This approach preserves a highly drought-resistant, protein-rich crop essential for food security in arid regions while removing the risk of beta-ODAP induced neurotoxicity and spastic paralysis in consumers.

106. (B) 1.0 mg/L
According to the Bureau of Indian Standards, the permissible limit for fluoride in drinking water is one milligram per liter. This concentration provides dental protection against caries without posing risks of systemic toxicity. In the absence of an alternative water source, the maximum permissible limit can be extended up to one point five milligrams per liter.

107. (A) Both A and R are true and R is the correct explanation of A.
Prolonged consumption of water with elevated fluoride levels causes skeletal fluorosis. Fluoride has a high physiological affinity for calcium-rich tissues. It replaces hydroxyl ions in hydroxyapatite crystals to form fluorapatite, stimulating osteoblasts and leading to abnormal bone formation, osteosclerosis, calcification of ligaments, and severe joint pain and physical stiffness.

108. (B) Knock-knee deformity in youth from high fluoride and low calcium
Genu valgum, commonly known as knock-knee syndrome, is a severe manifestation of endemic fluorosis observed in children and young adults. This skeletal deformity occurs due to the combined effects of chronic high fluoride intake and low dietary calcium, which disrupts normal bone mineralization, leading to osteoporosis, ligament laxity, and outward bowing of the lower limbs.

109. (A) 1, 2, and 3
Significant sources of fluoride exposure in humans include groundwater contaminated by fluoride-rich rocks, black tea, which naturally accumulates fluoride, and fluoridated toothpaste when accidentally ingested by children. Conversely, dietary iodized salt is a vehicle for iodine fortification to prevent thyroid disorders and does not serve as a source of fluoride exposure.

110. (C) Chronic fluoride toxicity
The patient's symptoms of joint stiffness, inability to bend, neck pain, and brownish, chalky striations on the dental enamel are indicative of chronic fluoride toxicity. These symptoms represent the classic dual manifestations of dental and skeletal fluorosis, caused by the long-term ingestion of groundwater containing high concentrations of fluoride in endemic areas.

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111. (A) P-III, Q-IV, R-I, S-II
Fluorosis manifests in different clinical forms. Dental fluorosis causes mottling, pitting, and chalky patches on the teeth. Skeletal fluorosis is characterized by osteosclerosis, ligament calcification, and joint stiffness. Non-skeletal fluorosis presents with gastrointestinal complaints and muscle weakness, while genu valgum represents the classic knock-knee syndrome observed in young people.

112. (A) Both Statement I and Statement II are true.
The Nalgonda technique is an effective defluoridation method developed by the National Environmental Engineering Research Institute in India. It is a community-level water treatment process that utilizes alum for coagulation and lime for pH control. This combination facilitates the flocculation and sedimentation of fluoride ions, significantly reducing their concentration in drinking water.

113. (B) Low iodine → Decreased T3/T4 → Increased TSH → Thyroid hyperplasia (Goitre))
Iodine deficiency reduces the synthesis of thyroid hormones thyroxine and triiodothyronine. This reduction triggers the pituitary gland to release increased levels of thyroid-stimulating hormone. Elevated thyroid-stimulating hormone levels continuously overstimulate the thyroid gland, leading to follicular cell hypertrophy and hyperplasia, which manifests clinically as thyroid gland enlargement, or goitre.

114. (D) It is entirely reversible if the person moves to an area with low fluoride water.
Dental fluorosis is an irreversible condition because the structural damage, pitting, and brown staining of the enamel occur during the developmental stages of tooth formation. Once these teeth erupt into the oral cavity, moving to an area with low-fluoride drinking water cannot reverse the permanent structural changes or cosmetic discoloration of the enamel.

115. (A) High intake of Vitamin C, Calcium, and Antioxidants
To mitigate fluoride toxicity in endemic areas, public health strategies recommend dietary modification alongside defluoridation. A diet rich in calcium, Vitamin C, and antioxidants is beneficial because calcium binds fluoride in the gastrointestinal tract to reduce absorption, Vitamin C enhances collagen synthesis, and antioxidants mitigate the systemic oxidative stress caused by fluoride.

116. (C) Activated Alumina - Adsorption of fluoride ions
Activated alumina is a highly effective filter medium used in defluoridation because of its high surface area and specific affinity for fluoride. The mechanism involves the physical adsorption of fluoride ions onto the alumina surface when water passes through the filter. This method is widely used in both domestic and community-scale water treatment systems.

117. (A) By competitively inhibiting iodine uptake by the thyroid
Dietary goitrogens, such as thiocyanates found in brassica vegetables like cabbage, exacerbate iodine deficiency by competitively inhibiting the sodium-iodide symporter on thyroid follicular cells. This inhibition blocks active transport of iodine into the thyroid gland, reducing thyroid hormone synthesis and exacerbating goitre, especially in populations with low or marginal iodine intake.

118. (D) Adult - Hyperthyroidism, increased basal metabolic rate
Iodine deficiency in adults is associated with hypothyroidism and a decreased basal metabolic rate, not hyperthyroidism. The spectrum of iodine deficiency disorders includes severe manifestations across different life stages, such as miscarriage and cretinism in the fetus, neonatal goitre in newborns, and impaired cognitive function and delayed physical development in children and adolescents.

119. (B) Potassium iodate
The Nalgonda technique is a chemical precipitation method for water defluoridation that utilizes alum, lime, and bleaching powder. Alum acts as a coagulant, lime adjusts the pH and facilitates flocculation, and bleaching powder is added for disinfection. Potassium iodate is a chemical used for salt iodisation and is not involved in the defluoridation process.

120. (C) Urinary iodine excretion in children
Urinary iodine excretion in school-age children is the most reliable biological indicator for assessing the recent iodine status of a community. Since more than ninety percent of ingested iodine is excreted in the urine, urinary iodine concentrations directly reflect dietary intake, making it a highly sensitive marker for monitoring the success of salt iodisation programs.

121. (D) Potassium iodate
Under the Universal Salt Iodisation programme in India, potassium iodate is the chemical compound legally mandated for fortifying edible salt. It is selected over potassium iodide because of its superior chemical stability in warm, humid tropical climates and its resistance to degradation

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during storage, transport, and exposure to impurities present in unrefined salt.

122. (A) Both A and R are true and R is the correct explanation of A.
Potassium iodate is preferred for salt iodisation in tropical countries like India because it is chemically more stable than potassium iodide. It is highly resistant to oxidation and volatilization when exposed to high environmental humidity, heat, sunlight, and the acidic impurities typically found in coarse, unrefined salt, ensuring consistent iodine levels at consumption.

123. (B) It is fortified with both Iodine and Iron to treat IDD and anaemia.
Double fortified salt is a public health intervention designed to address two major micronutrient deficiencies simultaneously: iodine deficiency disorders and iron deficiency anemia. This specialized salt is fortified with potassium iodate and encapsulated ferrous fumarate. The encapsulation prevents chemical interactions between iron and iodine, preserving their bioavailability and stability in food.

124. (D) 1, 2, 3, and 4
Vitamin A deficiency manifests in various clinical stages of xerophthalmia. These include night blindness, conjunctival xerosis, Bitot's spots, corneal xerosis, and keratomalacia, which represents the irreversible destruction and liquefaction of the cornea. These ocular signs progress in severity and require immediate high-dose vitamin A administration to prevent permanent blindness and reduce childhood mortality.

125. (A) Bitot's spots
The presence of raised, silvery-white, foamy triangular patches on the bulbar conjunctiva, accompanied by night blindness, is diagnostic of Bitot's spots. This lesion is a hallmark clinical sign of vitamin A deficiency, representing keratin debris accumulation. It occurs due to squamoid metaplasia of the conjunctival epithelium and a loss of mucin-secreting goblet cells.

126. (A) P-IV, Q-III, R-II, S-I
The World Health Organization classifies the ocular stages of xerophthalmia systematically. Under this classification, stage X1A corresponds to conjunctival xerosis, and stage X1B represents Bitot's spots. Stage X2 is characterized by corneal xerosis, and stage X3A is diagnosed when corneal ulceration affects less than one-third of the total corneal surface.

127. (A) Both Statement I and Statement II are true.
The National Prophylaxis Programme in India utilizes a structured dosing schedule to prevent vitamin A deficiency in children. Infants receive a first dose of one hundred thousand international units at nine months of age alongside the measles vaccine. Subsequently, doses of two hundred thousand international units are administered every six months until the age of five.

128. (A) II, III, IV, I
The ocular manifestations of vitamin A deficiency progress systematically from functional deficits to structural damage. The earliest clinical sign is night blindness, which is followed by the development of conjunctival Bitot's spots. If untreated, this progresses to corneal xerosis, characterized by dry, hazy corneas, and ultimately to keratomalacia, which involves corneal melting and necrosis.

129. (B) Phytates and tannins strongly inhibit the absorption of heme iron.
Phytates and tannins do not inhibit the absorption of heme iron, which is absorbed as an intact metalloporphyrin complex through a dedicated transporter. These dietary inhibitors strictly affect the absorption of non-heme iron by binding it in the gut. Non-heme iron absorption is enhanced by Vitamin C and acidic gastric environments.

130. (D) Add starch solution and weak acid; a blue-purple color indicates iodine.
To rapidly test for iodine in salt, a field testing kit utilizes the starch-iodine reaction. Adding a weak acid and a starch solution to the salt sample converts potassium iodate into free iodine. This free iodine reacts with the starch to form a distinct blue-purple complex, confirming the presence of iodine in the salt.

131. (A) Ascorbic acid - Iron
Ascorbic acid is a highly effective enhancer of non-heme iron absorption. It reduces ferric iron to the more soluble ferrous state and forms a stable chelate in the duodenum, preventing iron from binding to inhibitory phytates or tannins. Conversely, phytic acid and oxalic acid act as

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secondary hyperparathyroidism and bone disease. Managing this condition requires restricting dietary phosphorus intake and prescribing oral phosphate binders with meals to reduce the absorption of phosphorus in the gastrointestinal tract.

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potassium and fluid are monitored to prevent accumulation. In hepatic encephalopathy, protein is managed, particularly aromatic amino acids. Hypertension requires restricting sodium to lower blood pressure, while celiac disease necessitates the complete elimination of gluten to prevent autoimmune damage to the small intestine.

142. (D) Statement I is false but Statement II is true.
Nutritional guidelines indicate that general energy requirements for patients living with HIV do not automatically increase by ten to thirty percent across all stages. However, because certain antiretroviral drugs can place a heavy metabolic load on the kidneys, monitoring and sometimes reducing protein intake is recommended to prevent or manage renal strain.

143. (D) Isoniazid therapy → Pyridoxine (Vitamin B_6) interference → Neuropathy
Isoniazid, a primary drug used in tuberculosis treatment, interferes with pyridoxine metabolism by competitively inhibiting pyridoxine kinase and forming an inactive complex that is rapidly excreted. This depletion of active Vitamin B6 impairs myelin synthesis, resulting in peripheral neuropathy. Consequently, co-administration of pyridoxine supplements is recommended for patients receiving isoniazid therapy to prevent neurological complications.

144. (C) Energy requirements are decreased due to the lethargy associated with the disease.
The statement that energy requirements are decreased in tuberculosis patients is incorrect. In reality, tuberculosis is a chronic infectious disease characterized by hypermetabolism and fever, which significantly increases resting energy expenditure. Energy requirements are actually elevated by twenty to thirty percent to prevent severe cachexia, tissue wasting, and weight loss associated with the active infection.

145. (B) High protein, low potassium and phosphorus, fluid-restricted
For a patient with end-stage renal disease undergoing regular hemodialysis, nutritional requirements change. Dialysis removes nitrogenous wastes but also causes significant amino acid loss, necessitating a high-protein diet. However, to prevent uremic complications between sessions, the enteral formula must remain fluid-restricted and low in potassium and phosphorus, which the kidneys can no longer excrete.

146. (D) Steatosis (Fatty Liver) - Weight loss and restricted simple sugars/alcohol
Hepatic steatosis, or fatty liver disease, is managed through lifestyle modifications, including gradual weight loss, regular exercise, and restricting simple sugars and alcohol, which drive hepatic de novo lipogenesis. Conversely, uncomplicated hepatitis requires a high-protein diet, ascites necessitates strict sodium restriction, and hepatic encephalopathy requires protein management, rather than high levels of aromatic amino acids.

147. (A) BCAAs compete with aromatic amino acids at the blood-brain barrier.
In hepatic encephalopathy, liver dysfunction leads to an altered plasma amino acid ratio, characterized by low levels of branched-chain amino acids and elevated aromatic amino acids. Supplementing with branched-chain amino acids restores this balance, as they competitively inhibit the transport of aromatic amino acids across the blood-brain barrier, reducing the synthesis of neurotoxic false neurotransmitters.

148. (C) Nevirapine - Calcium depletion and rickets
Nevirapine is a non-nucleoside reverse transcriptase inhibitor whose primary side effects include hepatotoxicity and severe skin rashes, not calcium depletion or rickets. Other antiretroviral drugs have established metabolic side effects: protease inhibitors are linked to hyperlipidemia and insulin resistance, zidovudine causes bone marrow suppression leading to anemia, and some regimens drive lipodystrophy.

149. (A) Eradicating viral load via mega-dosing vitamins
The eradication of HIV viral load cannot be achieved through dietary modifications or mega-dosing vitamins, as viral replication requires antiretroviral therapy. Instead, the primary goals of nutritional therapy in HIV/AIDS are to preserve lean body mass, prevent muscle wasting syndrome, support immune function, manage metabolic complications of antiretroviral therapy, and maintain hydration and electrolyte balance during chronic diarrhea.

150. (D) Prescribe phosphate binders with meals and restrict dietary phosphorus.
In pre-dialysis chronic kidney disease, hyperphosphatemia occurs due to reduced renal excretion of phosphorus. High phosphorus levels trigger parathyroid hormone secretion, leading to

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P. Descriptive Epidemiology
Q. Analytical Epidemiology
R. Environmental Investigation
S. Case Finding

List II: (Associated Action)

I. Testing hypotheses using case-control or cohort studies
II. Plotting epidemic curves and spot maps
III. Alerting local clinics to report specific symptoms
IV. Inspecting kitchen premises and swabbing surfaces

(A) P-II, Q-I, R-IV, S-III
(B) P-I, Q-II, R-III, S-IV
(C) P-IV, Q-III, R-II, S-I
(D) P-II, Q-IV, R-I, S-III

39. Identify the correct statement regarding the reporting of foodborne outbreaks:
(A) Only massive foodborne outbreaks resulting in documented fatalities must be formally reported to national health authorities.
(B) An outbreak is considered laboratory-confirmed only when the pathogen is isolated from both human cases and the implicated food.
(C) Local municipal health departments are strictly prohibited from initiating an outbreak investigation without federal permission.
(D) Epidemiological evidence can be sufficient to classify an outbreak without isolating the pathogen from food.

40. An FSO receives a call regarding multiple people vomiting after eating at a local diner. What is the most competent first action for the FSO according to the systematic approach?
(A) Verify the existence of the outbreak and establish a baseline.
(B) Immediately shut down the diner's kitchen and revoke its business license.
(C) Issue an immediate press release naming the diner as an active health hazard.
(D) Begin interviewing all customers who ate at the diner over the entire past year.

41. Arrange the following initial steps of an outbreak investigation in the standard chronological sequence:
1. Define and identify cases
2. Establish the existence of an outbreak
3. Prepare for field work
4. Verify the diagnosis
5. Perform descriptive epidemiology

Which of the following represents the correct sequence?
(A) 3, 2, 4, 1, 5
(B) 2, 3, 4, 1, 5
(C) 3, 4, 2, 1, 5
(D) 1, 2, 3, 4, 5

42. Multiple children presenting with bloody diarrhea are admitted to a pediatric ward over two days. Preliminary interviews indicate they all attended a community fair. Based on case-based outbreak logic, which step must the epidemiologist undertake to confirm a common source outbreak?
(A) Initiate immediate antibiotic prophylaxis treatments for the entire local community.
(B) Define a case and systematically search for more cases linked to the fair.
(C) Wait for final pathogen genome sequencing results before asking any further questions.
(D) Close down all active community fairs in the surrounding district permanently.

43. Which of the following defines a "pseudo-outbreak"?
(A) An apparent increase in cases due to reporting changes or errors rather than true incidence.
(B) A confirmed outbreak that is primarily caused by an entirely new and unknown pathogen.
(C) A localized environmental outbreak that affects only domestic animals but not humans.
(D) A highly typical epidemic curve that consistently shows no visible, distinct peaks.

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44. What is the most appropriate reason for establishing a systematic approach to outbreak investigations?
(A) To deliberately delay the implementation of costly control measures until official academic papers are published.
(B) To primarily assign legal blame and financial liability to food business operators before the investigation ends.
(C) To ensure a rigorous process that prevents premature conclusions and guides rapid public health action.
(D) To completely bypass the need for expensive, time-consuming laboratory confirmation of

CHAPTER 37

Epidemic, Endemic, Pandemic and Outbreak Investigation

1. Which of the following best defines the term "endemic" in the context of disease occurrence?
(A) The constant presence of a disease or infectious agent within a given geographic area or population group.
(B) The sudden occurrence of a disease clearly in excess of normal expectancy in a community.
(C) An epidemic that has spread over several countries or continents, usually affecting a large number of people.
(D) The irregular and infrequent occurrence of a disease in a scattered manner.

2. Consider the following statements regarding disease occurrence classifications:
1. An outbreak is an epidemic localized to a specific geographic area or institution.
2. A sporadic disease occurs at irregular intervals and in unpredictable locations.
3. A pandemic requires a high mortality rate to be officially declared.
4. An epidemic can occur even if the absolute number of cases is small, provided it exceeds baseline expectations.

Which of the above statements are correct?
(A) 1, 2, and 3
(B) 1, 2, and 4
(C) 2, 3, and 4
(D) 1, 3, and 4

3. Identify the correct pair regarding epidemic curves and their typical exposure patterns:
(A) Propagated epidemic – Features successive peaks reflecting the disease's incubation period.
(B) Point-source epidemic – Features a rapid rise and fall of cases from a single exposure event.
(C) Continuous common-source epidemic – Features a prolonged plateau of cases due to ongoing exposure.
(D) Intermittent common-source epidemic – Features irregularly spaced peaks due to recurrent exposures.

4. Which of the following is an exception to the characteristics of a typical point-source foodborne outbreak?
(A) All primary cases occur within a single incubation period.
(B) The outbreak is highly explosive and sudden in nature.
(C) It typically involves consumption of a single contaminated food vehicle.
(D) The epidemic curve exhibits multiple progressive peaks.

5. Read the given assertion and reason, and select the correct option.
Assertion (A): The epidemic curve of a point-source outbreak typically shows a sharp upward slope and a gradual downward slope.
Reason (R): In a point-source outbreak, all susceptible individuals are exposed simultaneously, and the varied incubation periods among individuals create a right-skewed tail on the curve.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

6. A local health department observes 3 cases of botulism scattered across different cities over 6 months with no apparent epidemiological link. Which concept best applies to this pattern of occurrence?
(A) Hyperendemic
(B) Pandemic
(C) Sporadic
(D) Propagated epidemic

7. Identify the incorrect statement regarding epidemic curves:

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(A) The x-axis represents the time of illness onset, while the y-axis represents the number of cases.
(B) The overall shape of the curve can help investigators hypothesize the mode of transmission.
(C) Outliers on an epidemic curve can help identify the index case or potential secondary cases.
(D) The x-axis time interval should equal the disease's average incubation period.

8. Match the terms in List I with their descriptions in List II and select the correct option:
List I: (Term)
P. Index case
Q. Primary case
R. Secondary case
S. Suspect case
List II: (Description)
I. The first case introduced into a population
II. A case infected by primary cases
III. The first case to come to the attention of health authorities
IV. An individual meeting clinical criteria without lab confirmation
(A) P-III, Q-I, R-II, S-IV
(B) P-I, Q-III, R-II, S-IV
(C) P-III, Q-II, R-I, S-IV
(D) P-I, Q-II, R-III, S-IV

9. Identify the correct statement regarding propagated epidemics:
(A) They usually arise from a single contaminated food batch served at a banquet.
(B) They exhibit a series of peaks separated by approximately one incubation period.
(C) They are primarily controlled by rapidly removing the contaminated environmental source.
(D) The number of new cases declines immediately after the primary exposure event.

10. A Food Safety Officer (FSO) analyzes a sharply peaking epidemic curve traced to a community picnic. What is the most competent initial hypothesis the FSO should form regarding the transmission mode?
(A) The disease is spreading person-to-person within the community.
(B) A specific contaminated food item was consumed by attendees at the picnic.
(C) The pathogen has been continuously contaminating the local water supply for months.
(D) The outbreak is sporadic and unrelated to the picnic event.

11. Arrange the following events in the correct chronological sequence of a typical point-source foodborne outbreak:
1. Consumption of contaminated food
2. Peak number of symptom onsets
3. Contamination of the food source
4. Gradual decline in new cases
5. End of the incubation period for the earliest cases
Which of the following represents the correct chronological sequence?
(A) 3, 1, 5, 2, 4
(B) 1, 3, 5, 2, 4
(C) 3, 1, 2, 5, 4
(D) 1, 5, 3, 2, 4

12. A wedding reception was held on Saturday night. By Monday morning, 40 out of 100 guests developed severe gastroenteritis. The epidemic curve shows a single, tight cluster of cases. What type of outbreak does this scenario most likely represent?
(A) Propagated epidemic
(B) Intermittent common-source epidemic
(C) Point-source epidemic
(D) Continuous common-source epidemic

13. What defines a continuous common-source outbreak?
(A) Exposure to a single common source occurs briefly and simultaneously for all affected cases.
(B) Transmission occurs strictly from host to host over a prolonged period without a source.
(C) Sporadic exposures result in widely separated individual cases over a long period.
(D) Exposure to the source is prolonged, causing an epidemic curve with a plateau.

14. Which of the following represents the most appropriate differentiation between an intermittent and continuous common-source epidemic?
(A) The intermittent source utilizes a known bacterial pathogen, while the continuous source utilizes an unknown viral pathogen.

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(B) The intermittent source exclusively causes foodborne illness, while the continuous source exclusively causes waterborne illness.
(C) Intermittent sources produce irregularly spaced peaks, while continuous sources produce a plateau.
(D) The intermittent source curve always falls back to the zero baseline, while continuous source curves never reach zero.

15. What is the primary cause-and-effect relationship explaining the prolonged tail in a continuous common-source epidemic curve compared to a point-source curve?
(A) Person-to-person transmission continuously increases the total number of secondary cases over time.
(B) Ongoing exposure to the vehicle continually infects new individuals.
(C) The pathogen rapidly mutates within the host, which significantly prolongs the expected incubation period.
(D) Significant diagnostic delays cause late reporting of active cases to the local health authorities.

16. Which of the following defines the Basic Reproductive Number (R_0)?
(A) The actual, observed number of secondary cases generated in a population with mixed immunity levels.
(B) The exact threshold percentage of immune individuals required to successfully stop an ongoing epidemic.
(C) The baseline genetic mutation rate of a pathogen during an active, rapidly spreading outbreak.
(D) Expected secondary cases from one infection in a fully susceptible population.

17. Consider the following variables that influence the basic reproductive number (R_0) of an infectious agent:
1. Duration of infectivity of the patient
2. Probability of infection being transmitted during contact
3. The size of the herd immunity threshold
4. The contact rate between infected and susceptible individuals

Which of the above variables are directly used to calculate R_0?
(A) 1, 2, and 4
(B) 1, 3, and 4
(C) 2, 3, and 4
(D) 1, 2, and 3

18. Identify the correct pair regarding the value of R_0 and the corresponding epidemic outcome:
(A) $R_0 < 1$: The infection will spread exponentially in the population.
(B) $R_0 = 1$: The disease will become endemic in the population.
(C) $R_0 > 1$: The disease will inevitably die out over a short period.
(D) $R_0 = 0$: The pathogen has reached a continuous common-source state.

19. Which of the following factors is an exception and NOT used in calculating the basic Herd Immunity Threshold (HIT)?
(A) The case fatality rate of the disease
(B) The basic reproductive number (R_0)
(C) The proportion of the population that needs to be immune
(D) The formula $1 - (1/R_0)$

20. Read the given assertion and reason, and select the correct option.
Assertion (A): A disease with an R_0 of 15 requires a higher herd immunity threshold to control than a disease with an R_0 of 3.
Reason (R): The herd immunity threshold is directly proportional to the transmissibility of the pathogen in a completely susceptible population.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

21. A novel zoonotic virus has entered a human population. Epidemiologists calculate the basic reproductive number (R_0) to be 4. What is the basic Herd Immunity Threshold (HIT) required to halt the epidemic spread?
(A) 25%
(B) 50%
(C) 75%
(D) 90%

22. Identify the incorrect statement regarding the effective reproductive number (R_e):
(A) It represents the average number of secondary cases produced in a population

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that is partially immune.
(B) R_e can fluctuate during an outbreak based on public health interventions.
(C) R_e is an innate biological constant of the pathogen that cannot be altered.
(D) If R_e drops below 1, the incidence of new cases will decrease.

23. Match the parameters in List I with their definitions in List II and select the correct option:
List I: (Parameter)
P. R_0
Q. R_e (or R_t)
R. Herd Immunity Threshold
S. Attack Rate
List II: (Definition)
I. Proportion of exposed persons who become ill
II. Secondary infections in a completely susceptible population
III. Minimum percentage of immune individuals to halt transmission
IV. Secondary infections in a population with varying immunity
(A) P-II, Q-IV, R-III, S-I
(B) P-IV, Q-II, R-III, S-I
(C) P-II, Q-IV, R-I, S-III
(D) P-III, Q-I, R-II, S-IV

24. Identify the correct statement regarding herd immunity in the context of foodborne outbreaks:
(A) Herd immunity calculations are relevant for foodborne pathogens with person-to-person spread.
(B) Herd immunity plays a major role in halting point-source outbreaks of non-communicable foodborne toxins.
(C) High herd immunity directly prevents the initial contamination of the food source in industrial processing plants.
(D) Herd immunity is achieved immediately after the food recall and public notification procedures are initiated.

25. An FSO is dealing with a propagated outbreak of Hepatitis A linked to a food handler. If the R_0 is estimated at 2, what proportion of the local susceptible population must be vaccinated to theoretically achieve herd immunity?
(A) 33%
(B) 50%
(C) 66%
(D) 80%

26. Arrange the following states of effective reproductive number (R_e) as they typically occur during a successfully controlled propagated outbreak:
1. R_e drops below 1 due to interventions and acquired immunity
2. R_e is at its maximum (approximately equal to R_0) at the start
3. R_e reaches 0 as the outbreak ends
4. R_e begins to decrease but remains above 1 as interventions start
Which of the following represents the correct chronological sequence?
(A) 2, 4, 1, 3
(B) 1, 2, 4, 3
(C) 2, 1, 4, 3
(D) 4, 2, 1, 3

27. During a newly introduced Salmonella typhi outbreak in an unimmunized isolated village, one infected individual spreads the bacteria to 5 others through shared water. Those 5 individuals each spread it to 5 more people. This scenario specifically illustrates the concept of:
(A) Basic reproductive number (R_0)
(B) The minimum herd immunity threshold required
(C) The food-specific primary attack rate
(D) The overall clinical case fatality rate

28. Which of the following defines the secondary attack rate?
(A) The number of new cases occurring in a specified time period among total population.
(B) The proportion of individuals who develop the disease out of the total population exposed to the primary vehicle.
(C) The proportion of susceptible individuals who develop the infection after exposure to a primary case.
(D) The rate of death among those who have developed secondary complications.

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29. What is the most appropriate distinction between R_0 and R_e?
(A) R_0 is strictly utilized for viral pathogen outbreaks, while R_e is utilized for bacterial pathogen outbreaks.
(B) R_0 fluctuates based on natural seasonal variations, whereas R_e remains completely fixed throughout the epidemic.
(C) R_0 is applied only to propagated outbreaks, whereas R_e is applied exclusively to localized

common-source outbreaks.
(D) R_0 assumes full susceptibility, whereas R_e accounts for actual immunity and interventions.

30. What is the direct cause-and-effect relationship of implementing a highly effective quarantine and isolation strategy during a propagated outbreak?
(A) It artificially increases the biological R_0 value of the pathogen.
(B) It rapidly increases the minimum herd immunity threshold required.
(C) It lowers the contact rate, reducing R_e.
(D) It alters the fundamental biological incubation period of the disease.

31. By standard epidemiological definition, how many cases of a similar illness resulting from the ingestion of a common food constitute a foodborne disease outbreak?
(A) At least 1 case
(B) At least 2 cases
(C) At least 5 cases
(D) At least 10 cases

32. Consider the following steps in an outbreak investigation:
1. Verify the diagnosis
2. Establish the existence of an outbreak
3. Prepare for field work
4. Implement control and prevention measures
Which of the above represent the correct initial preparatory and verification steps?
(A) 1, 2, 3
(B) 2, 3, 4
(C) 1, 3, 4
(D) 1, 2, 4

33. Identify the correct pair regarding the step in outbreak investigation and its objective:
(A) Step 1: Prepare for fieldwork – Compiling and publishing the final outbreak report.
(B) Step 2: Establish existence – Comparing cases to expected baseline levels.
(C) Step 6: Perform descriptive epidemiology – Calculating relative risks using cohort studies.
(D) Step 9: Implement control measures – Rapidly formulating the initial case definition.

34. Which of the following is an exception and NOT typically an immediate, early step in a systematic outbreak investigation?
(A) Verifying the clinical diagnosis of early cases
(B) Establishing the actual existence of an outbreak
(C) Conducting a randomized clinical trial
(D) Constructing a clear, working case definition

35. Read the given assertion and reason, and select the correct option.
Assertion (A): The existence of an outbreak is established only when the observed number of cases exceeds the expected number of cases for a given population and time.
Reason (R): Seasonal variations and enhanced reporting systems can artificially increase case numbers, creating a "pseudo-outbreak."
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

36. A hospital reports 15 cases of Salmonellosis in one week. The historical baseline for this week is usually 12 to 18 cases. Applying systematic outbreak criteria, what should the FSO conclude?
(A) A severe outbreak is currently underway requiring immediate, nationwide food recalls.
(B) The hospital administration must immediately declare a national Public Health Emergency.
(C) The historical baseline data is completely invalid and should be entirely ignored.
(D) The cases do not exceed baseline; an outbreak is not established yet.

37. Identify the incorrect statement regarding the systematic approach to outbreak investigation:
(A) Control measures should be implemented as soon as a source is identified, even if the investigation is ongoing.
(B) Steps in an outbreak investigation are always strictly sequential and cannot be conducted concurrently.
(C) Verifying the diagnosis involves reviewing clinical findings and laboratory results.
(D) Communication of findings is a continuous process throughout the outbreak.

38. Match the investigation phases in List I with their associated actions in List II and select the correct option:
List I: (Investigation Phase)

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inhibitors rather than enhancers of mineral absorption in the gut.

132. (C) Impaired RBP synthesis prevents mobilization of Vitamin A stores.
In children with severe protein-energy malnutrition, hepatic synthesis of retinol-binding protein is severely impaired due to amino acid deficiencies. Consequently, despite receiving vitamin A supplements, the liver cannot synthesize the carrier protein needed to mobilize and transport retinol to target tissues. Therefore, nutritional protein rehabilitation must accompany vitamin A supplementation to resolve deficiency signs.

133. (A) sTfR - Decreases during iron deficiency
Soluble transferrin receptor levels increase during iron deficiency, not decrease. When cellular iron stores are depleted, cells upregulate transferrin receptors on their membranes to maximize iron uptake, leading to increased shedding of these receptors into the serum. Other biomarkers, such as serum ferritin, transferrin saturation, and hemoglobin, are correctly described in relation to iron status.

134. (D) Ascorbic acid from citrus fruits
Ascorbic acid is not a dietary inhibitor of non-heme iron absorption; rather, it is a potent enhancer. It facilitates absorption by reducing insoluble ferric iron to soluble ferrous iron and preventing its binding to inhibitors. Phytates from whole grains, polyphenols from tea, and calcium from dairy products are well-known inhibitors that impair non-heme iron absorption in the gut.

135. (B) Mandatory fortification of staple foods
Mandatory fortification of staple foods, such as wheat, rice, and salt, is the most sustainable and cost-effective population-level strategy to combat hidden hunger. This approach delivers essential micronutrients like iron, iodine, and vitamins to large populations through foods they already consume daily, requiring no behavioral changes and incurring minimal ongoing distribution or manufacturing costs.

136. (C) Acrodermatitis enteropathica
Acrodermatitis enteropathica is a rare, severe genetic disorder characterized by a mutation in the ZIP4 transporter, leading to impaired zinc absorption. This condition presents with classic clinical signs of severe zinc deficiency, including periorificial and acral dermatitis, alopecia, and chronic diarrhea. It can also occur as an acquired state due to prolonged, severe dietary zinc deficiency.

137. (A) Both A and R are true and R is the correct explanation of A.
Zinc deficiency is directly associated with impaired immune function and increased susceptibility to infectious pathogens. This occurs because zinc is a vital cofactor for numerous metalloenzymes and transcription factors. It is essential for the proliferation, differentiation, and normal function of immune cells, including T-lymphocytes, B-lymphocytes, neutrophils, and natural killer cells in the immune system.

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138. (A) Soaking and germinating legumes reduces phytates, enhancing zinc absorption.
Soaking and germinating legumes activates endogenous phytases, which break down phytic acid, a strong dietary inhibitor of zinc absorption. Reducing phytate content significantly enhances the bioavailability of zinc from plant-based foods. In contrast, animal proteins are rich sources of highly bioavailable zinc, and high doses of iron supplements can competitively inhibit zinc absorption in the gut.

139. (A) 1, 2, and 3
The dietary management of pre-dialysis chronic kidney disease focuses on reducing renal workload and preventing uremic toxicity. Standard guidelines recommend restricting dietary protein, limiting sodium and fluid intake to prevent fluid overload and hypertension, and restricting potassium and phosphorus to avoid hyperkalemia and bone-mineral disorders. Vitamin A intake is monitored closely to prevent toxic accumulation.

140. (B) Ammonia
Hepatic encephalopathy in patients with liver cirrhosis is primarily driven by the accumulation of systemic ammonia. Under normal conditions, the liver detoxifies ammonia, a neurotoxic byproduct of protein metabolism, into urea. In a diseased liver or in the presence of portal-systemic shunting, ammonia bypasses hepatic metabolism, crosses the blood-brain barrier, and causes astrocyte swelling and neurotoxicity.

141. (A) P-III, Q-IV, R-I, S-II
Specific clinical conditions require targeted nutritional restrictions. In chronic kidney disease,

suspected pathogens.

45. What is the primary cause-and-effect reason for initiating control measures before an investigation is fully completed?
(A) Because extensive laboratory investigations are entirely unnecessary for identifying common foodborne pathogens.
(B) Because modern analytical epidemiology studies typically take several years of statistical analysis to complete.
(C) Because widespread public panic and media pressure always necessitate immediate, dramatic administrative action.
(D) Because delaying control measures until proof is gathered causes preventable illnesses and deaths.

46. Which of the following professionals is considered a core member of a multidisciplinary foodborne outbreak investigation team?
(A) Financial Auditor
(B) Agricultural Economist
(C) Epidemiologist
(D) Legal Counsel

47. Consider the following roles within an outbreak investigation team:
1. Epidemiologist: Designs studies and analyzes data.
2. Microbiologist: Analyzes clinical and environmental samples.
3. Environmental Health Officer (FSO): Inspects food premises and collects food samples.
4. Clinician: Manages patient treatment and collects clinical data.

Which of the above roles are typically utilized in an outbreak investigation team?
(A) 1, 2, and 3
(B) 2, 3, and 4
(C) 1, 3, and 4
(D) 1, 2, 3, and 4

48. Identify the correct pair regarding standard case definitions:
(A) Suspected case – A case with laboratory confirmation of the pathogen but presenting no clinical symptoms.
(B) Probable case – Meets clinical and epidemiological criteria, but lacks lab confirmation.
(C) Confirmed case – A case presenting only non-specific symptoms and having no apparent epidemiological link.
(D) Primary case – An early clinical case that is completely asymptomatic throughout the entire illness.

49. Which of the following is an exception and NOT typically a component of a standard case definition during an outbreak?
(A) Patient's genetic predispositions
(B) Clinical criteria (symptoms)
(C) Time constraints (onset of illness)
(D) Place restrictions (location of exposure)

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50. Read the given assertion and reason, and select the correct option.
Assertion (A): In the early stages of an outbreak investigation, investigators often use a sensitive case definition.
Reason (R): A sensitive case definition ensures that as many potential cases as possible are identified and not missed, even if some false positives are included.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

51. An individual presents with abdominal cramps and diarrhea 24 hours after a banquet but has not yet provided a stool sample. Under a standard three-tier classification, how should this individual be classified pending laboratory results?
(A) Probable case
(B) Confirmed case
(C) Non-case
(D) Index case

52. Identify the incorrect statement regarding the development of case definitions:
(A) A case definition routinely includes specific criteria for person, place, time, and clinical features.
(B) Case definitions may be continually revised and significantly tightened as the investigation progresses.
(C) Different levels of certainty (suspected, probable, confirmed) are systematically used to categorize cases.
(D) A highly specific case definition is preferred

at the beginning to restrict cases.

53. Match the team members in List I with their primary functions in List II and select the correct option:
List I: (Team Member)
P. Public Health Physician
Q. Laboratory Scientist
R. Food Safety Officer
S. Statistician / Epidemiologist
List II: (Primary Function)
I. Conducts trace-back of food ingredients
II. Isolates the pathogen from clinical specimens
III. Calculates Odds Ratios and Attack Rates
IV. Provides medical management to patients
(A) P-IV, Q-II, R-I, S-III
(B) P-I, Q-III, R-II, S-IV
(C) P-IV, Q-I, R-II, S-III
(D) P-II, Q-IV, R-III, S-I

54. Identify the incorrect statement regarding case finding during an outbreak:
(A) Active case finding relies solely on patients voluntarily visiting hospitals.
(B) Passive surveillance is more labor-intensive than active surveillance during an outbreak.
(C) Case finding may involve reviewing emergency department logs and laboratory records.
(D) Once the index case is found, case finding efforts are immediately halted.

55. An FSO realizes that the initial case definition for an acute gastroenteritis outbreak is capturing many people with unrelated viral stomach bugs. What is the most competent action to take?
(A) Discard all previously collected epidemiological data entirely and restart the study.
(B) Immediately stop the entire investigation as the baseline data is deemed contaminated.
(C) Broaden the case definition significantly further to capture a much larger group of people.
(D) Refine the case definition by adding a specific symptom or a narrower time window.

56. Consider the following statements and select the correct option.
Statement I: The formation of an outbreak investigation team should only occur after analytical epidemiology confirms the source.
Statement II: A multidisciplinary team ensures that clinical, epidemiological, and environmental aspects of the outbreak are addressed simultaneously.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

57. During a suspected cholera outbreak, an investigator finds a patient who fits the clinical description (severe watery diarrhea) and resides in the affected district. However, a rapid diagnostic test is negative, and stool culture results are pending. How is this case categorized temporarily?
(A) Confirmed infection case
(B) Suspected or probable case
(C) Completely excluded case
(D) Asymptomatic pathogen carrier

58. What defines "clinical criteria" within a case definition?
(A) The specific geographic boundaries and physical locations where the exposure occurred.
(B) The signs, symptoms, and diagnostic tests characterizing the illness.
(C) The complete demographic profile and risk factors of the affected individuals.
(D) The precise calendar date and time parameters marking the active outbreak period.

59. What is the most appropriate reason for including "Time" in a case definition?
(A) To exclude sporadic cases occurring outside the outbreak period.
(B) To identify exactly when and where the pathogen genetically mutated.
(C) To determine the shelf life and expiry of the implicated food product.
(D) To schedule reference laboratory testing and personnel more efficiently.

60. What is the direct cause-and-effect outcome of using an excessively broad (hyper-sensitive) case definition throughout an entire investigation?
(A) It accurately and rapidly targets the specific primary vehicle of infection.
(B) It consistently ensures a perfectly precise calculation of relative risk values.
(C) It dilutes study results by including non-cases, obscuring the source.

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(D) It significantly reduces the diagnostic workload for the laboratory team.

61. Which three variables form the foundation of descriptive epidemiology?
(A) Agent, Host, Environment
(B) Incidence, Prevalence, Mortality
(C) Pathogenicity, Virulence, Infectivity
(D) Time, Place, Person

62. Consider the following tools used in descriptive epidemiology:
1. Epidemic curve
2. Spot map
3. Demographic frequency tables
4. Logistic regression models

Which of the above tools are strictly used for descriptive (not analytical) epidemiology?
(A) 1, 2, and 3
(B) 2, 3, and 4
(C) 1, 2, and 4
(D) 1, 3, and 4

63. Identify the correct pair regarding descriptive epidemiological variables and their standard visual representation:
(A) Person – Epidemic curve
(B) Place – Spot map
(C) Time – Spot map
(D) Person – Trace-back diagram

64. Which of the following is an exception and NOT a primary method for generating a hypothesis during an outbreak?
(A) Reviewing descriptive epidemiological data (time, place, person)
(B) Conducting open-ended interviews with early cases
(C) Analyzing previous outbreaks of a similar nature
(D) Conducting a randomized double-blind clinical trial

65. Read the given assertion and reason, and select the correct option.
Assertion (A): Plotting a spot map of cases based on their residence or workplace is crucial in a foodborne outbreak.
Reason (R): Spot maps can reveal clusters of cases related to localized water sources, specific grocery stores, or restaurants.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

66. An epidemic curve reveals a sharp spike in cases exactly 12 hours after a large community dinner. The cases rapidly taper off within 24 hours. Applying descriptive epidemiological concepts, what does this time distribution suggest?
(A) The pathogen has a very long incubation period (weeks).
(B) The outbreak is propagated via person-to-person contact.
(C) The outbreak is a point-source exposure with a short incubation period.
(D) The outbreak is caused by a continuous exposure to heavy metals in water.

67. Identify the incorrect statement regarding hypothesis generation in outbreak investigations:
(A) Hypothesis generation relies strictly on laboratory sequencing, never on interviews.
(B) Hypotheses should clearly address the primary source of the agent and its mode of transmission.
(C) Early, open-ended interviews with a few initial cases can provide critical clues for a hypothesis.
(D) The working hypothesis directly guides the design of subsequent analytical epidemiology studies.

68. Match the descriptive variables in List I with their specific examples in List II and select the correct option:
List I: (Descriptive Variable)
P. Time
Q. Place
R. Person
S. Risk factor
List II: (Specific Example)
I. Age, sex, occupation
II. Date of onset of symptoms
III. Attendance at a specific banquet
IV. Ward number in a hospital
(A) P-II, Q-IV, R-I, S-III
(B) P-I, Q-II, R-IV, S-III
(C) P-II, Q-I, R-III, S-IV
(D) P-IV, Q-II, R-I, S-III

69. Identify the correct statement regarding "Person" analysis in descriptive epidemiology:

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(C) Both foods are equally implicated.
(D) Neither food is implicated; further descriptive studies are needed.

101. Consider the following statements and select the correct option.
Statement I: Whole Genome Sequencing (WGS) is highly useful in outbreak investigations because it can differentiate between closely related strains of a pathogen.
Statement II: WGS has largely replaced traditional epidemiological interviews, making descriptive epidemiology obsolete.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

102. In calculating the Relative Risk for consuming raw oysters during a Vibrio outbreak: 50 people ate oysters (40 ill, 10 well). 50 people did not eat oysters (5 ill, 45 well). The attack rate for exposed is 80%, and unexposed is 10%. What is the Relative Risk?
(A) 0.8
(B) 4.0
(C) 8.0
(D) 10.0

103. What defines "food-specific attack rate"?
(A) The total percentage of food items in a kitchen that test positive for a bacterial pathogen.
(B) The overall speed at which an isolated pathogen multiplies within a specific solid food matrix.
(C) Clinical ratio of highly severe hospitalized cases to entirely asymptomatic carriers.
(D) The proportion of consumers of a specific food who subsequently became ill.

104. Which of the following is the most appropriate reason for seeking laboratory confirmation of the causative agent during an outbreak?
(A) To confirm the pathogen, which guides clinical treatment and directs precise control measures.
(B) To deliberately delay critical public health actions until absolute, undeniable certainty is achieved.
(C) To provide sufficient legal evidence solely for the criminal prosecution of negligent food handlers.
(D) Because standard epidemiological survey data alone is never legally recognized in public health courts.

105. What is the likely cause-and-effect consequence of improper temperature control during the transport of clinical stool samples from the field to the laboratory?
(A) Spontaneous genetic mutation of the target pathogen into an entirely harmless strain.
(B) Overgrowth of other flora and pathogen death, causing false negatives.
(C) The automatic and immediate high-temperature sterilization of the sample container.
(D) A highly significant, artificial increase in the calculated Relative Risk values.

106. In India, which is the primary nodal agency under the Ministry of Health and Family Welfare responsible for national disease surveillance, including foodborne epidemics?
(A) FSSAI (Food Safety and Standards Authority of India)
(B) NCDC (National Centre for Disease Control) / IDSP
(C) ICMR (Indian Council of Medical Research)
(D) BIS (Bureau of Indian Standards)

107. Consider the following functions related to outbreak reporting in India:
1. ICMR primarily conducts advanced biomedical research and laboratory confirmation.
2. FSSAI regulates food safety standards and initiates food recalls.
3. IDSP operates a decentralized surveillance network for epidemic-prone diseases.
4. BIS is responsible for calculating attack rates during outbreaks.

Which of the above statements are correct?
(A) 1, 2, and 4
(B) 1, 3, and 4
(C) 1, 2, and 3
(D) 2, 3, and 4

108. Identify the correct pair connecting a major historical foodborne outbreak in India with its primary cause:
(A) Lathyrism – Extensive consumption of raw, Aflatoxin-contaminated maize grains.
(B) Aflatoxicosis – Regular consumption of toxic Kesari dal (Lathyrus sativus) seeds.

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(A) 1, 2, and 4
(B) 1, 3, and 4
(C) 2, 3, and 4
(D) 1, 2, and 3

78. Identify the correct pair matching the study design with its typical measure of association:
(A) Cohort Study – Odds Ratio (OR)
(B) Case-Control Study – Relative Risk (RR)
(C) Case-Control Study – Odds Ratio (OR)
(D) Cross-Sectional Study – Attack Rate Ratio

79. Which of the following is an exception and NOT an objective of an environmental investigation during a foodborne outbreak?
(A) Identifying potential sources of contamination in a kitchen
(B) Administering clinical treatments to affected food handlers
(C) Reviewing food preparation and storage processes
(D) Collecting environmental swabs and food samples for laboratory analysis

80. Read the given assertion and reason, and select the correct option.
Assertion (A): A case-control study is highly suitable for investigating an outbreak linked to a nationwide distributed product where the total exposed population is unknown.
Reason (R): In a case-control study, investigators do not need to know the entire exposed population; they compare exposures among identified cases against a selected control group.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

81. An FSO is investigating a gastroenteritis outbreak following a private wedding reception with a strictly known guest list of 100 people. Which analytical study design is most appropriate to apply?
(A) Retrospective Cohort Study
(B) Case-control investigation study
(C) Randomized controlled clinical trial
(D) Descriptive ecological study design

82. Identify the incorrect statement regarding environmental investigation and food sampling:
(A) Trace-back investigations aim to identify the origin of the contaminated food item across the supply chain.
(B) Collecting leftover food from a patient's home can provide crucial laboratory evidence.
(C) Environmental swabbing should focus only on floors and ignore food contact surfaces.
(D) Identifying a cross-contamination route in a kitchen is a key goal.

83. Match the analytical concepts in List I with their descriptions in List II and select the correct option:
List I: (Analytical Concept)
P. Cohort Study
Q. Case-Control Study
R. Controls
S. Recall Bias
List II: (Description)
I. Error occurring when cases remember exposures differently than controls
II. Compares ill vs well individuals for past exposures
III. People without the disease used for comparison
IV. Compares exposed vs unexposed individuals for disease development
(A) P-IV, Q-II, R-III, S-I
(B) P-II, Q-IV, R-III, S-I
(C) P-IV, Q-II, R-I, S-III
(D) P-III, Q-I, R-II, S-IV

84. Identify the correct statement regarding food sampling during an outbreak investigation:
(A) Any available food in the facility should be sampled, even if epidemiological evidence does not implicate it.
(B) Samples should be carefully stored at room temperature during transport to preserve the viability of pathogens.
(C) Environmental investigations are only necessary and useful if clinical samples fail to yield any known pathogen.
(D) Aseptic techniques must be followed when collecting samples to prevent secondary contamination.

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85. An FSO conducts an environmental audit of a restaurant kitchen implicated in a Salmonella outbreak. Which finding represents a critical control point failure requiring immediate corrective action?
(A) Consistently using different colored cutting

boards for raw meat and raw vegetables.
(B) Storing raw chicken above ready-to-eat salads in the cooler.
(C) Regularly checking internal cooking temperatures of poultry with a calibrated thermometer.
(D) Washing hands thoroughly with warm water and soap immediately after handling raw eggs.

86. Consider the following statements and select the correct option.
Statement I: In a retrospective cohort study, the investigator compares the attack rate among the exposed to the attack rate among the unexposed.
Statement II: If the Relative Risk (RR) is calculated to be 1.0, it indicates a strong positive association between the food item and the illness.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

87. In a case-control study investigating an outbreak of E. coli O157:H7, the Odds Ratio for eating undercooked beef is 8.5, and the Odds Ratio for drinking raw milk is 1.2. Which conclusion is case-based and accurate?
(A) Drinking raw milk is the single definite cause of the entire outbreak.
(B) Eating undercooked beef serves as a highly protective factor against the illness.
(C) Both food vehicles are equally and fully responsible for causing the outbreak.
(D) Undercooked beef is strongly associated with illness.

88. What is the definition of a trace-back investigation?
(A) Tracking a food product backward through the supply chain to its origin.
(B) Comprehensively tracing a patient's medical history to find pre-existing chronic conditions.
(C) Tracing the precise evolutionary mutations of an isolated pathogen using modern WGS methods.
(D) Tracing the exact genetic lineage of specific individuals who are highly susceptible to a disease.

89. Which is the most appropriate strategy for collecting food samples during an environmental investigation?
(A) Wait until the analytical epidemiology study is completely finished and peer-reviewed before collecting samples.
(B) Collect targeted samples as soon as possible before they are discarded.
(C) Only collect samples from completely unopened, perfectly sealed commercial food storage containers.
(D) Only collect environmental food samples if a symptomatic patient or lawyer specifically requests it.

90. What is the primary cause-and-effect concern regarding "recall bias" in a case-control study of a foodborne outbreak?
(A) Food manufacturers and processors may selectively recall batches of food, thereby destroying critical physical evidence.
(B) Cases may ruminate on exposures and over-report them compared to controls, skewing the Odds Ratio.
(C) Healthy study controls consistently maintain near-perfect memories of every single food item they consumed.
(D) Widespread recall bias physically and directly alters the clinical incubation period of the active pathogen.

91. What is the mathematical formula for calculating a specific Attack Rate?
(A) (Number of new cases / Total population at risk) $\times$ 100
(B) (Number of deaths / Number of cases) $\times$ 100
(C) (Number of ill persons who ate the food / Total persons who did not eat the food) $\times$ 100
(D) (Number of secondary cases / Number of primary cases) $\times$ 100

92. Consider the interpretations of Relative Risk (RR) in a cohort study:
1. $RR = 1$: No association between exposure and disease.
2. $RR > 1$: Exposure is associated with increased risk of disease.
3. $RR < 1$: Exposure is associated with decreased risk (protective).
4. $RR = 0$: Indicates a 100% attack rate.

Which of the above statements are correct?

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(A) 1, 2, and 4
(B) 1, 3, and 4
(C) 1, 2, and 3
(D) 2, 3, and 4

93. Identify the correct pair connecting a common foodborne pathogen with its typical incubation period:
(A) Salmonella species – 10 to 15 days
(B) Listeria monocytogenes – 2 to 4 hours
(C) Clostridium botulinum – 3 to 4 weeks
(D) Staphylococcus aureus – 1 to 6 hours

94. Which of the following is an exception and NOT typically a standard method for laboratory confirmation of a foodborne pathogen?
(A) Culturing the organism on selective media
(B) Polymerase Chain Reaction (PCR)
(C) Magnetic Resonance Imaging (MRI)
(D) Whole Genome Sequencing (WGS)

95. Read the given assertion and reason, and select the correct option.
Assertion (A): A high attack rate for a specific food item does not automatically prove it is the vehicle of infection if the relative risk is low.
Reason (R): If a food is widely consumed by everyone (e.g., water or ice), its attack rate will be high among cases, but it will also be high among controls, resulting in an RR near 1.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

96. At a luncheon, 40 people ate the potato salad, and 30 of them became ill. What is the food-specific attack rate for the potato salad?
(A) 30%
(B) 40%
(C) 75%
(D) 133%

97. Identify the incorrect statement regarding the interpretation of statistical measures in outbreak investigations:
(A) A Confidence Interval containing 1.0 indicates a statistically significant association.
(B) An Odds Ratio (OR) of 5.0 indicates the odds of exposure among cases is 5 times higher than among controls.
(C) Statistical significance (e.g., a p-value < 0.05) is often evaluated alongside the RR or OR.
(D) Relative Risk can be calculated directly in a cohort study but not in a case-control study.

98. Match the laboratory methods in List I with their key features or uses in List II and select the correct option:
List I: (Laboratory Method)
P. Serology/ELISA
Q. PCR (Polymerase Chain Reaction)
R. Bacterial Culture
S. Whole Genome Sequencing (WGS)
List II: (Key Feature/Use)
I. Rapidly amplifies pathogen DNA for detection
II. Detects antibodies or antigens to confirm infection
III. Grows the live organism for identification and testing
IV. Provides extreme high-resolution genetic fingerprinting to link cases
(A) P-II, Q-I, R-III, S-IV
(B) P-I, Q-II, R-IV, S-III
(C) P-III, Q-IV, R-I, S-II
(D) P-IV, Q-III, R-II, S-I

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99. Identify the correct statement regarding food-specific attack rates:
(A) The difference in attack rates between exposed and unexposed helps pinpoint the vehicle.
(B) The food-specific attack rate among unexposed individuals in the study must always be exactly 0%.
(C) Food-specific attack rates cannot be calculated unless the exact bacterial load in food is known.
(D) Food-specific attack rates are exclusively restricted for use in clinical case-control studies.

100. An investigator constructs a cohort table. Food A has an attack rate of 80% in those who ate it and 10% in those who didn't (RR=8.0). Food B has an attack rate of 85% in those who ate it and 80% in those who didn't (RR=1.06). As a competent FSO, which food do you implicate?
(A) Food A, because it has a significantly higher Relative Risk.
(B) Food B, because it has a higher absolute attack rate (85%).

(A) It only involves assessing the specific genetic makeup of the cases.
(B) It identifies which demographic groups are at highest risk.
(C) It is visualized primarily by plotting a standard epidemic curve.
(D) It proves the exact contaminated food item that caused the outbreak.

70. An FSO is conducting initial interviews for a salmonella outbreak. Several cases mention eating at different branches of the same fast-food chain, but no common local event was attended. What is the most competent hypothesis to formulate?
(A) The outbreak is caused by a localized and transient water contamination event.
(B) The observed cases are purely sporadic and represent no common exposure source.
(C) A contaminated commercial ingredient is widely distributed to the chain.
(D) Employees at one specific branch are intentionally contaminating the served food.

71. Consider the following statements and select the correct option.
Statement I: Descriptive epidemiology focuses on testing hypotheses to establish cause and effect.
Statement II: Analytical epidemiology involves the observation of person, place, and time characteristics without a comparison group.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

72. A spot map during a listeriosis outbreak reveals that cases are not clustered locally but spread nationwide. Based on place analysis, what does this indicate?
(A) A widely distributed commercial food product is the likely vehicle.
(B) The outbreak is likely linked directly to a local community bake sale event.
(C) The active infection is spreading through the primary municipal water supply.
(D) It represents a propagated epidemic characterized by a highly elevated R_0 value.

73. What is the definition of a "spot map" in epidemiology?
(A) A specialized map plotting the genetic mutations of a clinical virus.
(B) A map marking case locations to identify geographic patterns.
(C) A complex chart showing the exact time each individual case consumed food.
(D) A physical blueprint of a food processing facility used for trace-back.

74. What is the most appropriate reason for using open-ended questionnaires during the early hypothesis-generating phase?
(A) They are significantly faster to code into statistical software than standard closed-ended questions.
(B) They let cases mention exposures investigators might not have suspected.
(C) They immediately and automatically yield highly definitive, food-specific attack rates.
(D) They strictly restrict participant responses to a pre-defined list of common pathogens.

75. What is the primary cause-and-effect reason that demographic data (Person) can point to specific food vehicles?
(A) Different demographic groups have distinct dietary habits or food preferences.
(B) Specific pathogens physically and rapidly alter the demographic structure of a population.
(C) Comprehensive demographic data completely replaces the need for any clinical laboratory testing.
(D) Biological age strictly determines the exact incubation period of all foodborne diseases.

76. Which measure of association is fundamentally calculated in a cohort study during an outbreak investigation?
(A) Odds Ratio
(B) Case Fatality Rate
(C) Relative Risk
(D) Proportionate Mortality Ratio

77. Consider the following characteristics of analytical study designs:
1. Cohort studies are preferred when the exposed population is well-defined.
2. Case-control studies compare people with the disease to people without the disease.
3. Case-control studies calculate Relative Risk directly.
4. Cohort studies classify individuals based on exposure status.

Which of the above statements are correct?

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(C) Epidemic Dropsy – Mustard oil adulterated with Argemone mexicana.
(D) Minamata Disease – Outbreaks due to eating Ergot-contaminated bajra grains.

109. Which of the following is an exception and NOT a core function of the FSSAI during a foodborne outbreak investigation?
(A) Coordinating with State Food Safety Commissioners for product recall
(B) Issuing public health advisories regarding contaminated food brands
(C) Conducting traceback investigations of food supply chains
(D) Conducting clinical trials for new antibiotics

110. Read the given assertion and reason, and select the correct option.
Assertion (A): The Integrated Disease Surveillance Programme (IDSP) requires immediate notification of clustering of acute diarrheal cases.
Reason (R): Rapid notification under IDSP triggers the rapid response team (RRT) to initiate timely epidemiological investigations and containment measures.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

111. An FSO discovers an unlicensed food manufacturing unit heavily adulterating cooking oil. Several locals have reported swelling of legs and heart problems. Applying historical epidemiological knowledge, what disease should the FSO suspect?
(A) Aflatoxicosis
(B) Epidemic Dropsy
(C) Neurolathyrism
(D) Salmonellosis

112. Identify the incorrect statement regarding India's outbreak reporting systems:
(A) IDSP integrates data from primary health centers up to the national level.
(B) FSSAI manages the Food Safety Compliance System (FoSCoS) which helps in tracing licensed food vendors.
(C) Outbreak data flow involves local medical officers reporting via designated formats (S, P, and L forms).
(D) The Indian Council of Medical Research (ICMR) enforces the Food Safety and Standards Act.

113. Match the major outbreaks or conditions in India in List I with their implicated toxins or agents in List II and select the correct option:
List I: (Major Outbreak/Condition in India)
P. Epidemic Dropsy
Q. Lathyrism
R. Aflatoxicosis
S. Ergotism
List II: (Implicated Toxin/Agent)
I. BOAA (Beta-N-oxalylamino-L-alanine)
II. Sanguinarine
III. Claviceps purpurea toxins
IV. Aspergillus flavus toxins
(A) P-II, Q-I, R-IV, S-III
(B) P-I, Q-II, R-III, S-IV
(C) P-IV, Q-III, R-II, S-I
(D) P-II, Q-IV, R-I, S-III

114. Identify the correct statement regarding IDSP surveillance forms:
(A) The "S" form is strictly used by advanced reference laboratories.
(B) The "L" form is used by village health workers for syndromic surveillance.
(C) The "P" form relies on presumptive diagnoses made by Medical Officers.
(D) The forms are exclusively meant for tracking non-communicable diseases like diabetes.

115. A State FSO is part of a Rapid Response Team (RRT) investigating a massive food poisoning event at a school mid-day meal. What is the FSO's core competency action within this team?
(A) Seizing food samples and auditing kitchen hygiene.
(B) Administering essential IV fluids directly to the affected children.
(C) Drafting the final official clinical hospital discharge summaries.
(D) Updating the online IDSP database portal with patient vital readings.

116. Consider the following statements and select the correct option.
Statement I: The massive 1974 outbreak in Rajasthan and Gujarat causing hepatitis and fatalities was due to consumption of maize contaminated with Aflatoxin.

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Statement II: Aflatoxicosis is typically an acute bacterial infection transmitted through contaminated water.

(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

117. During periods of unseasonal rain and poor storage conditions, a rural population heavily relying on maize reports jaundice and ascites. Based on case-based epidemiological history, this is highly indicative of:
(A) Ergotism
(B) Aflatoxicosis
(C) Lathyrism
(D) Epidemic Dropsy

118. What defines "public health surveillance"?
(A) The rapid, one-time analytical epidemiological study designed to investigate a specific localized outbreak.
(B) The formal legal prosecution of municipal food business operators violating basic sanitary and hygiene norms.
(C) The ongoing, systematic collection and analysis of health data for public health planning.
(D) The specialized in-vitro biological study and genetic sequencing of pathogens within a secure laboratory setting.

119. What is the most appropriate reason for robust coordination between FSSAI and ICMR during a major foodborne crisis?
(A) To systematically share the ongoing financial profits of audited commercial food businesses.
(B) So that both national agencies can completely independently declare separate disease outbreaks.
(C) To deliberately bypass the administrative oversight of the Ministry of Health entirely.
(D) FSSAI handles food regulation, while ICMR provides clinical and lab expertise.

120. What is the major cause-and-effect consequence of delayed reporting of an acute foodborne illness cluster by a local clinic to the IDSP network?
(A) The contaminated food remains on the market, causing preventable illnesses.
(B) The intrinsic basic reproductive number (R_0) of the pathogen physically and rapidly decreases.
(C) The diagnostic laboratory permanently loses the physical ability to sequence the pathogen genome.
(D) The localized outbreak automatically and immediately gets officially classified as a global pandemic.

121. What does the acronym IDSP stand for in the Indian public health framework?
(A) Indian Department of Food Safety and Civil Protection
(B) Integrated Disease Surveillance Programme
(C) International Pathogen Disease Spread and Control Protocol
(D) Institutional Dietary Safety and Nutrition Programme

122. Consider the core principles of the "One Health" approach:
1. Recognizing the interconnection between human health, animal health, and the environment.
2. Promoting exclusively human-centric biomedical interventions.
3. Facilitating collaborative, multisectoral, and transdisciplinary efforts.
4. Addressing antimicrobial resistance (AMR) and zoonotic diseases effectively.

Which of the above statements are correct?
(A) 1, 2, and 3
(B) 1, 3, and 4
(C) 2, 3, and 4
(D) 1, 2, and 4

123. Identify the correct pair regarding International Health Regulations (IHR 2005) concepts:
(A) WHO – Primary agency responsible for declaring a PHEIC.
(B) PHEIC – A localized, endemic outbreak requiring no international action.
(C) IHR 2005 – Applies exclusively to chemical food contamination.
(D) National Focal Point – The local city mayor responsible for reporting to WHO.

124. Which of the following is an exception and NOT one of the 4 criteria used by the IHR (2005) decision instrument to assess if an event may constitute a PHEIC?
(A) The potential public health impact of the event is highly serious.
(B) The detected epidemiological event is highly

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unusual or unexpected.
(C) The event originates from a laboratory leak.
(D) There is an extremely significant risk of rapid international spread.

125. Read the given assertion and reason, and select the correct option.
Assertion (A): The "One Health" framework is critical for pandemic preparedness, especially for emerging infectious diseases.
Reason (R): The majority of emerging infectious diseases (e.g., COVID-19, Nipah, Avian Influenza) are zoonotic, originating at the human-animal-environment interface.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

126. Applying lessons from the COVID-19 pandemic to food safety, which measure enhances the resilience of the food supply chain against epidemic disruptions?
(A) Rapidly centralizing all food processing and distribution systems into a single regional mega-facility.
(B) Completely eliminating all national food safety regulations to significantly speed up factory production.
(C) Implementing biosafety protocols, decentralized supply chains, and worker monitoring.
(D) Relying solely and extensively on imported, pre-packaged international agricultural products.

127. Identify the incorrect statement regarding the declaration of a Public Health Emergency of International Concern (PHEIC):
(A) It is declared by the Director-General of the WHO.
(B) It legally compels member states to close all international borders permanently.
(C) It requires an extraordinary event that constitutes a public health risk to other states through international spread.
(D) COVID-19 and Mpox have previously been declared as PHEICs.

128. Match the IDSP reporting forms in List I with their types of surveillance data in List II and select the correct option:
List I: (IDSP Reporting Form)
P. S Form
Q. P Form
R. L Form
List II: (Type of Surveillance Data)
I. Laboratory confirmed data
II. Presumptive diagnosis data by Medical Officer
III. Syndromic surveillance data by Health Workers
(A) P-III, Q-II, R-I
(B) P-I, Q-II, R-III
(C) P-II, Q-III, R-I
(D) P-III, Q-I, R-II

129. Identify the correct statement regarding the COVID-19 pandemic as a case study for food safety:
(A) The pandemic exposed vulnerabilities in plants due to close worker proximity and poor ventilation.
(B) SARS-CoV-2 is primarily a classical foodborne pathogen transmitted via direct ingestion of contaminated food.
(C) Discarded commercial food packaging was universally proven to be the primary driver of global pandemic spread.
(D) The pandemic proved that respiratory viral agents cannot survive on frozen food surfaces under any conditions.

130. A highly lethal, novel strain of avian influenza is detected in poultry farms in India, with multiple suspected human transmissions. Under the One Health and IHR (2005) frameworks, what is the most competent action?
(A) The Ministry of Agriculture manages the outbreak secretly in order to protect international trade.
(B) Immediate and complete culling of all regional poultry flocks without any human health monitoring.
(C) Joint investigation by animal and human health sectors, with immediate notification to WHO.
(D) Deliberately waiting for the avian virus to naturally mutate further before making any formal report.

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48. (B) Probable case – Meets clinical and epidemiological criteria, but lacks lab confirmation.
Outbreak case definitions utilize different categories to classify levels of diagnostic certainty. A probable case is defined as an individual who meets the established clinical and epidemiological criteria for the disease but lacks definitive laboratory confirmation. This category allows investigators to track likely cases when laboratory specimens are unavailable or pending.

49. (A) Patient's genetic predispositions
A standard case definition is a set of uniform criteria used to decide whether an individual should be classified as having the disease. It strictly includes clinical criteria, such as symptoms, alongside restrictions on time, place, and person. It does not include highly individualized, non-standard factors like genetic predispositions.

50. (A) Both A and R are true and R is the correct explanation of A.
During the initial stages of an outbreak investigation, a sensitive case definition is utilized to identify as many potential cases as possible. This broad definition ensures that genuine cases are not missed, which is critical for understanding the scope of the outbreak, even if it temporarily includes some unrelated illnesses.

51. (A) Probable case
Under standard epidemiological classification, an individual who displays clinical symptoms of the disease following a known exposure, but has not yet received laboratory confirmation, is categorized as a probable case. Once laboratory results successfully isolate the pathogen, the status is upgraded to a confirmed case.

52. (D) A highly specific case definition is preferred at the beginning to restrict cases.
At the start of an outbreak investigation, a broad, sensitive case definition is preferred to capture all potential cases and avoid missing critical data. As more epidemiological and laboratory details emerge, investigators systematically refine and tighten the criteria into a highly specific case definition, which effectively excludes non-cases.

53. (A) P-IV, Q-II, R-I, S-III
Multidisciplinary teams perform coordinated functions during an outbreak. Public health physicians provide clinical management and collect patient histories, laboratory scientists isolate and identify pathogens, food safety officers conduct traceback audits and environmental inspections, and epidemiologists utilize statistical methods to calculate attack rates and identify exposure risks.

54. (C) Case finding may involve reviewing emergency department logs and laboratory records.
Case finding is a critical step in determining the true extent of an outbreak. Rather than relying solely on passive surveillance, which suffers from underreporting, active case finding involves systematically reviewing clinical records, emergency logs, and laboratory files, and contacting healthcare facilities to identify all individuals who meet the case definition.

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55. (D) Refine the case definition by adding a specific symptom or a narrower time window.
If a case definition is too broad, it can capture unrelated background illnesses, which dilutes epidemiological associations. To correct this, investigators should refine the criteria by introducing a highly specific symptom or narrowing the time and geographic windows, thereby increasing specificity and ensuring the study focuses strictly on outbreak-related cases.

56. (D) Statement I is false but Statement II is true.
An outbreak investigation team must be established immediately at the start of an investigation, long before analytical study results are obtained. This multidisciplinary team ensures that clinical, environmental, and epidemiological investigations are launched concurrently, allowing for rapid data collection, source identification, and the immediate implementation of control measures.

57. (B) Suspected or probable case
When an individual presents with clinical symptoms characteristic of an outbreak disease and shares an epidemiological link to the affected area, but lacks definitive laboratory confirmation, they are classified as a suspected or probable case. A single negative rapid test does not exclude them while definitive culture results are still pending.

58. (B) The signs, symptoms, and diagnostic tests characterizing the illness.
Clinical criteria are the physiological signs, reported symptoms, and specific diagnostic findings that characterize an illness. Within a case definition, these criteria establish a standardized medical baseline that allows investigators to

139. Which of the following is an exception and NOT a standard component of post-outbreak review and corrective action?
(A) Permanently dismantling the local health department.
(B) Developing an After-Action Report (AAR).
(C) Identifying gaps in the surveillance and response systems.
(D) Implementing long-term HACCP improvements in the implicated food facility.

140. Read the given assertion and reason, and select the correct option.
Assertion (A): Active surveillance provides more accurate and complete incidence data than passive surveillance during an outbreak.
Reason (R): Active surveillance relies on routine, voluntary reporting by busy clinicians, which minimizes underreporting.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

141. An FSO wants to monitor the trend of Salmonella prevalence in retail poultry without exhausting department resources. Applying surveillance concepts, which strategy is most appropriate?
(A) Conducting intensive active surveillance of all commercial poultry farms in the state daily.
(B) Relying strictly on passive surveillance based entirely on unsolicited consumer complaints.
(C) Setting up continuous syndromic surveillance across all local and regional veterinary clinics.
(D) Establishing sentinel surveillance by sampling poultry from selected markets.

142. Identify the incorrect statement regarding control measures during an outbreak:
(A) Control measures can be directed at the source, the transmission route, or the susceptible host.
(B) A food recall is a control measure directed at interrupting the transmission route.
(C) Control measures must always wait until the final outbreak report is published.
(D) Hand hygiene promotion is an example of interrupting transmission.

143. Match the targets of control measures in List I with their specific actions in List II and select the correct option:
List I: (Target of Control Measure)
P. Controlling the Source
Q. Interrupting Transmission
R. Protecting Susceptible Hosts
List II: (Specific Action)
I. Pasteurizing milk and chlorinating water
II. Administering post-exposure prophylaxis or vaccines
III. Removing contaminated food from shelves (Recall)
(A) P-III, Q-I, R-II
(B) P-I, Q-III, R-II
(C) P-II, Q-I, R-III
(D) P-III, Q-II, R-I

144. Identify the correct statement regarding an After-Action Report (AAR):
(A) Its primary, foundational purpose is to assign sole legal blame to specific team members.
(B) It is always systematically formulated before the active outbreak investigation begins.
(C) It is legally and constitutionally required to be published in major national newspapers.
(D) It documents lessons learned, what worked, and needed future improvements.

145. An FSO gathers strong descriptive and analytical evidence linking a widely distributed brand of peanut butter to a Salmonella outbreak, but lab confirmation of the peanut butter is still pending. What is the most competent action?
(A) Initiate an immediate recall of the implicated batches based on epidemiological evidence.
(B) Take absolutely no action until the laboratory definitively confirms Salmonella presence in food.
(C) Immediately coordinate with police to arrest the chief executive of the peanut butter company.
(D) Issue an official public statement asserting that the peanut butter is safe until proven otherwise.

146. Consider the following statements and select the correct option.
Statement I: Sentinel surveillance involves using specifically selected institutions or groups to monitor diseases and trends.
Statement II: Sentinel surveillance is highly suitable for capturing every single case of a rare

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131. Consider the following statements and select the correct option.
Statement I: The One Health approach focuses exclusively on the veterinary treatment of livestock to improve agricultural yield.
Statement II: The One Health approach is increasingly applied to monitor antimicrobial resistance (AMR) flowing between animal farms, environment, and human populations.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

132. During an investigation of Nipah virus, investigators assess fruit bat habitats, pig farm practices, and human hospital infection control. This case-based scenario is a prime example of:
(A) Siloed approach
(B) Point-source traceback
(C) Passive surveillance
(D) One Health approach

133. What is the full form of PHEIC as defined under the International Health Regulations (2005)?
(A) Pandemic Health Epidemic of International Crisis
(B) Public Health Emergency of International Concern
(C) Primary Health Event in Intercontinental Countries
(D) Protocol for Health Emergencies of International Control

134. What is the most appropriate ultimate goal of the One Health framework in epidemic preparedness?
(A) To completely abolish all forms of commercial livestock and agricultural animal farming globally.
(B) To build and legally empower a single, centralized global government for managing human health.
(C) To proactively mitigate threats at the animal-human interface before they become pandemics.
(D) To replace certified human physicians exclusively with veterinarians in primary healthcare.

135. What is the primary cause-and-effect relationship between rapid deforestation and the increased risk of epidemics?
(A) Rapid deforestation directly increases the baseline basic reproductive number of existing human viruses.
(B) Deforestation permanently alters local climate patterns, which instantaneously creates completely new viral DNA.
(C) Extensive and unplanned deforestation directly and immediately causes acute chemical foodborne intoxications.
(D) Habitat destruction forces wildlife closer to humans, increasing zoonotic spillover risk.

136. Which of the following defines active surveillance?
(A) Health staff contacting healthcare facilities to actively seek out specific disease cases.
(B) Passively waiting for local hospitals to voluntarily send routine monthly infectious disease reports.
(C) Exclusively monitoring and analyzing the official mortality and death records of a specific region.
(D) Relying entirely and unstructuredly on unverified community rumors for major disease detection.

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137. Consider the following control measures during a foodborne outbreak:
1. Product recall and withdrawal from the market.
2. Temporary closure of the implicated food establishment.
3. Prophylactic antibiotic administration to the entire city population.
4. Public health advisories on safe food handling and cooking.

Which of the above represent standard, recommended control measures?
(A) 1, 2, and 3
(B) 1, 2, and 4
(C) 2, 3, and 4
(D) 1, 3, and 4

138. Identify the correct pair regarding surveillance systems:
(A) Sentinel surveillance – Collecting data from every single hospital in the country.
(B) Passive surveillance – Routine, provider-initiated reporting of notifiable diseases.
(C) Active surveillance – The least resource-intensive type of surveillance.
(D) Syndromic surveillance – Relying strictly on advanced whole genome sequencing results.

ANSWERS

1. (A) The constant presence of a disease or infectious agent within a given geographic area or population group.
Endemic refers to the constant, expected presence of a disease or infectious agent within a specific geographic area or population. Unlike an epidemic or pandemic, which represent sudden surges or widespread global transmission, endemic diseases maintain a relatively stable, baseline level of occurrence over long periods within a defined community.

2. (B) 1, 2, and 4
Outbreaks represent localized epidemics, while sporadic diseases occur unpredictably at irregular intervals. Epidemics require case numbers to exceed baseline expectations, regardless of the absolute count. Declaring a pandemic depends strictly on geographic spread across multiple countries or continents, not on mortality rates, meaning high mortality is not a requirement for an official declaration.

3. (A) Propagated epidemic – Features successive peaks reflecting the disease's incubation period.
Propagated epidemics spread from person to person, creating a series of increasingly taller peaks spaced roughly one incubation period apart. In contrast, point-source outbreaks arise from a brief, simultaneous exposure, continuous common-source outbreaks show a prolonged plateau due to ongoing exposure, and intermittent common-source outbreaks feature irregularly spaced peaks from repeated exposures.

4. (D) The epidemic curve exhibits multiple progressive peaks.
Point-source foodborne outbreaks feature a single, rapid exposure event. Consequently, the resulting epidemic curve displays a single, sharp peak followed by a gradual decline, with all primary cases occurring within one incubation period. Multiple progressive peaks indicate a propagated outbreak with person-to-person transmission, which contradicts the classic single-exposure nature of point-source incidents.

5. (A) Both A and R are true and R is the correct explanation of A.
Point-source epidemic curves rise sharply because many susceptible hosts are exposed to a pathogen simultaneously. The subsequent decline is gradual because individuals have varying incubation periods, meaning symptoms manifest at different times, which skews the curve to the right. This log-normal distribution is a direct mathematical consequence of individual biological variation in disease development.

6. (C) Sporadic
Sporadic disease occurrence refers to cases that are highly scattered, infrequent, and occur without any identifiable common source or epidemiological link. Because these botulism cases are isolated in time and space with no shared vehicle or contact pattern, they fit the definition of sporadic occurrence rather than an epidemic, hyperendemic, or pandemic state.

7. (D) The x-axis time interval should equal the disease's average incubation period.
Epidemic curves plot the number of cases on the vertical axis against the time of onset on the horizontal axis. To visualize the outbreak timeline effectively, the time interval on the horizontal axis must be carefully selected, typically representing one-eighth to one-third of the disease's known incubation period, rather than matching the full average incubation period.

8. (A) P-III, Q-I, R-II, S-IV
The primary case is the individual who first introduces the disease into a population, while the index case is the first case recognized by health authorities. Secondary cases arise from contact with primary cases. Suspect cases are individuals showing clinical symptoms consistent with the disease definition, but who lack definitive laboratory confirmation.

9. (B) They exhibit a series of peaks separated by approximately one incubation period.
Propagated epidemics occur when an infectious agent is transmitted from person to person. As the pathogen spreads through successive generations of hosts, the epidemic curve reveals a series of

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distinct peaks. Each peak is separated from the previous one by a duration that corresponds roughly to the typical incubation period of the specific disease.

10. (B) A specific contaminated food item was consumed by attendees at the picnic.
A sharply peaking epidemic curve linked to a single event indicates a point-source exposure. In this scenario, attendees at the picnic were likely exposed to a single contaminated food vehicle during a brief, concentrated window of time. This pattern differs from person-to-person spread or ongoing continuous contamination, which produce broader curves with multiple peaks or plateaus.

11. (A) 3, 1, 5, 2, 4
A typical point-source foodborne outbreak follows a precise chronological timeline. First, contamination of the food source occurs at some point prior to service. Next, individuals consume this contaminated food. Following exposure, the incubation period begins, ending when the earliest cases show symptoms. Cases then peak before gradually declining as susceptible individuals recover or are removed.

12. (C) Point-source epidemic
Point-source epidemics occur when a group of people is exposed to an infectious agent or toxin from a common source during a single, brief event. The rapid development of gastroenteritis within a short period among wedding guests who ate from a shared menu represents a classic point-source outbreak, characterized by a highly compressed timeline and a single peak.

13. (D) Exposure to the source is prolonged, causing an epidemic curve with a plateau.
A continuous common-source outbreak occurs when susceptible individuals are exposed to a contaminated vehicle over a prolonged period. Because the exposure is ongoing rather than a brief event, cases do not peak and fall rapidly. Instead, the epidemic curve rises and levels off into a plateau, which persists until the contaminated source is identified and removed.

14. (C) Intermittent sources produce irregularly spaced peaks, while continuous sources produce a plateau.
Common-source epidemics are distinguished by their exposure patterns over time. Intermittent common sources feature periodic, recurrent exposures, resulting in an epidemic curve with irregularly spaced peaks that may fall back to the baseline. Continuous common sources involve non-stop, prolonged exposure, which prevents the curve from falling and instead creates a steady, extended plateau of cases.

15. (B) Ongoing exposure to the vehicle continually infects new individuals.
The prolonged tail or plateau in a continuous common-source epidemic curve is caused by sustained exposure to the contaminated medium over time. Unlike a point-source event where exposure is brief and simultaneous, the persistent presence of the pathogen in the vehicle means new individuals are constantly exposed and infected, keeping the case count elevated for a longer duration.

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16. (D) Expected secondary cases from one infection in a fully susceptible population.
The basic reproductive number measures the transmission potential of an infectious agent. It represents the average number of secondary infections generated by a single infectious individual introduced into a completely susceptible population. This metric is a theoretical baseline reflecting the pathogen's biological capacity to spread in the absence of pre-existing immunity or public health interventions.

17. (A) 1, 2, and 4
The basic reproductive number is determined by the duration of infectivity of the host, the probability of transmission per contact, and the rate of contact between infected and susceptible individuals. While the herd immunity threshold is mathematically derived from this number, it is a consequence of transmission dynamics rather than a direct variable used to calculate the value itself.

18. (B) $R_0 = 1$: The disease will become endemic in the population.
The basic reproductive number dictates the long-term trajectory of an infectious disease. When the value is less than one, the infection will eventually die out. When the value exceeds one, the disease will spread exponentially in a susceptible population. A value of exactly one indicates that the disease will maintain a stable baseline level, remaining endemic.

19. (A) The case fatality rate of the disease
The herd immunity threshold represents the proportion of a population that must be immune to halt the transmission of an infectious agent. It is calculated using the formula that depends entirely on the basic reproductive number. The case fatality rate, which measures disease severity and mortality among clinical cases, does not influence transmission dynamics or the calculation.

20. (A) Both A and R are true and R is the correct explanation of A.
A higher basic reproductive number indicates a more transmissible pathogen. Consequently, a larger proportion of the population must possess immunity to effectively interrupt transmission. The herd immunity threshold is mathematically derived directly from this basic reproductive number, demonstrating that the level of collective immunity required to halt spread is proportional to the transmissibility of the disease.

21. (C) 75%
The herd immunity threshold determines the percentage of a population that must be immune to prevent an epidemic. Using the standard formula, one minus the reciprocal of the basic reproductive number, a pathogen with a value of four yields a threshold of three-quarters. Therefore, seventy-five percent of the population must achieve immunity to halt transmission.

22. (C) R_e is an innate biological constant of the pathogen that cannot be altered.
The effective reproductive number represents the actual transmission rate in a population with partial immunity. Unlike the basic reproductive number, which assumes complete susceptibility, this effective value is not a biological constant. It changes dynamically throughout an outbreak as public health interventions are implemented, behavioral patterns change, and natural immunity develops within the community.

23. (A) P-II, Q-IV, R-III, S-I
Epidemiological metrics define transmission dynamics. The basic reproductive number measures secondary cases in fully susceptible populations, while the effective reproductive number tracks transmission under varying immunity. The herd immunity threshold marks the minimum immune percentage needed to halt transmission, and the attack rate measures the proportion of exposed individuals who develop the disease.

24. (A) Herd immunity calculations are relevant for foodborne pathogens with person-to-person spread.
Herd immunity concepts apply exclusively to communicable diseases that spread between individuals, such as certain viral or bacterial foodborne pathogens with secondary transmission routes. Herd immunity is entirely irrelevant to point-source outbreaks of non-communicable foodborne toxins, as collective population immunity cannot prevent disease when individuals directly ingest pre-formed toxins from contaminated food.

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25. (B) 50%
Achieving herd immunity stops the continuous spread of a infectious pathogen. Applying the standard threshold formula of one minus the reciprocal of the basic reproductive number, a value of two requires exactly half of the population to be immune. Therefore, vaccinating fifty percent of the susceptible population is theoretically sufficient to establish herd immunity.

26. (A) 2, 4, 1, 3
During a controlled propagated outbreak, the effective reproductive number changes in a distinct chronological sequence. Initially, transmission is highest, with the value near the basic reproductive number. As interventions begin, transmission rates drop though remaining above one. Successful containment drives the value below one, reducing incidence until it reaches zero, marking the outbreak's end.

27. (A) Basic reproductive number (R_0)
The scenario of an infected individual introducing a pathogen into an unimmunized, isolated population and transmitting it to five others, who each continue to infect five more, illustrates the basic reproductive number. This parameter reflects the transmission potential of a pathogen under baseline conditions where the entire population is completely susceptible to the infection.

28. (C) The proportion of susceptible individuals who develop the infection after exposure to a primary case.
The secondary attack rate is a key metric measuring the infectivity of a pathogen within a closed environment. It calculates the proportion

disease in a large population.
(A) Both Statement I and Statement II are true.
(B) Both Statement I and Statement II are false.
(C) Statement I is true but Statement II is false.
(D) Statement I is false but Statement II is true.

147. A restaurant was linked to an E. coli outbreak due to cross-contamination between raw meat and salad preparations. The outbreak is over. As part of the post-outbreak corrective action, what case-based intervention must the FSO mandate?
(A) Mandate a rigorous HACCP plan focused on separate prep areas and verified temperatures.
(B) Legally require the restaurant to permanently serve only completely vegetarian food options.
(C) Automatically revoke the operational business licenses of all restaurants operating in the city.
(D) Only require the kitchen staff to complete a one-time intensive deep cleaning of the premises.

148. What defines "sentinel surveillance"?
(A) A system where national data is collected only when an international emergency is declared.
(B) A health monitoring system that relies entirely and solely on self-diagnosis by the public.
(C) The active, constant biological monitoring of diverse wildlife populations in dense forests.
(D) Monitoring health data from specific, pre-arranged sites to detect trends early.

149. What is the most appropriate primary aim of immediate control measures in a foodborne outbreak?
(A) To identify and isolate the exact genomic strain of the causative pathogen.
(B) To stop the outbreak and prevent further exposure to the vehicle.
(C) To collect sufficient unique clinical data to write a publishable scientific paper.
(D) To proactively test and evaluate novel, unproven epidemiological public health theories.

150. What is the primary cause-and-effect rationale for implementing long-term corrective actions (e.g., policy changes, structural modifications) following an outbreak review?
(A) To deliberately increase the long-term operational and compliance costs for the food business operator.
(B) To artificially justify the ongoing annual funding and staffing of the local public health department.
(C) To rectify the specific systemic failures, preventing similar outbreaks in the future.
(D) To fundamentally and permanently alter the physical, biological nature of the target foodborne pathogen.

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Analytical epidemiology tests hypotheses using comparison groups. Environmental investigations analyze food handling processes and take swabs, while case finding actively identifies individuals meeting clinical criteria.

39. (D) Epidemiological evidence can be sufficient to classify an outbreak without isolating the pathogen from food.
A foodborne outbreak can be officially confirmed using robust epidemiological evidence, such as highly significant relative risks derived from analytical studies, even if the pathogen is not successfully isolated from leftover food. Lab confirmation from clinical specimens combined with clear exposure patterns is sufficient for public health action and classification.

40. (A) Verify the existence of the outbreak and establish a baseline.
Following a systematic approach, the initial action upon receiving reports of illness is to verify the diagnosis and establish the existence of an outbreak. This requires comparing the observed cases against expected baselines to rule out pseudo-outbreaks before taking major regulatory actions, such as closing facilities or issuing public alerts.

41. (A) 3, 2, 4, 1, 5
A systematic outbreak investigation begins with administrative and logistical preparation for fieldwork. Once prepared, investigators immediately establish whether an outbreak exists, verify the clinical diagnosis, and define a case to identify affected individuals. Finally, they perform descriptive epidemiology to analyze the distribution of cases by time, place, and person.

42. (B) Define a case and systematically search for more cases linked to the fair.
To confirm a suspected common source outbreak, an epidemiologist must formulate a clear, objective case definition. This case definition allows investigators to systematically search for additional cases associated with the event. This descriptive step establishes the scope of the outbreak and provides the necessary data to perform analytical epidemiological studies.

43. (A) An apparent increase in cases due to reporting changes or errors rather than true incidence.
A pseudo-outbreak is an artificial rise in reported cases that does not reflect a true increase in disease incidence. This phenomenon can be caused by changes in surveillance protocols, increased public awareness, laboratory contamination, or diagnostic reporting errors, highlighting the necessity of verifying diagnoses and establishing baselines before declaring an outbreak.

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44. (C) To ensure a rigorous process that prevents premature conclusions and guides rapid public health action.
A systematic, structured approach to outbreak investigations ensures that public health investigations are conducted scientifically and thoroughly. This methodology prevents investigators from jumping to premature conclusions about the source of infection, while providing a clear framework to rapidly implement effective, evidence-based control measures to protect the public health.

45. (D) Because delaying control measures until proof is gathered causes preventable illnesses and deaths.
Implementing control measures during an outbreak should never be delayed until a definitive scientific or laboratory conclusion is reached. If descriptive and early analytical evidence strongly points to a specific source, immediate action must be taken, as waiting for absolute proof allows ongoing exposure, causing additional preventable illnesses and potential fatalities.

46. (C) Epidemiologist
A foodborne outbreak investigation requires a multidisciplinary team to address the complex aspects of transmission. An epidemiologist is a core member of this team, responsible for designing studies, developing case definitions, analyzing data, and calculating measures of association to identify the likely food vehicle and guide public health interventions.

47. (D) 1, 2, 3, and 4
Investigating foodborne outbreaks requires a multidisciplinary response team. Epidemiologists design studies and analyze data, microbiologists perform diagnostic testing on specimens, environmental health officers inspect facilities and collect food samples, and clinicians manage patient care while gathering clinical histories, ensuring all dimensions of the outbreak are addressed concurrently.

of susceptible individuals who develop the disease following direct contact with a primary case. This metric is crucial for evaluating person-to-person transmission potential, distinguishing it from the primary attack rate.

29. (D) R_0 assumes full susceptibility, whereas R_e accounts for actual immunity and interventions.
The basic reproductive number is a theoretical value representing transmission in a completely susceptible population without any control measures. In contrast, the effective reproductive number represents the actual transmission rate in a real-world population, accounting for varying levels of natural or acquired immunity, behavioral changes, and active public health interventions.

30. (C) It lowers the contact rate, reducing R_e.
Implementing strict quarantine and isolation measures directly limits physical contact between infected and susceptible individuals. By reducing the contact rate, these interventions lower the effective reproductive number without altering the pathogen's inherent biological traits. This reduction in transmission potential eventually brings the effective reproductive number below one, causing the outbreak to decline.

31. (B) At least 2 cases
By standard epidemiological definition, a foodborne disease outbreak is established when two or more individuals experience a similar illness after ingesting a common, contaminated food vehicle. An exception to this rule is chemical food poisoning or botulism, where a single confirmed case is often sufficient to trigger a comprehensive public health investigation.

32. (A) 1, 2, 3
The initial phases of an outbreak investigation focus on preparation and validation. Investigators must first prepare for fieldwork by assembling resources. They then establish the existence of an outbreak by comparing observed cases to historical baselines, and verify the clinical diagnosis using laboratory results before implementing widespread containment and control measures.

33. (B) Step 2: Establish existence – Comparing cases to expected baseline levels.
Establishing the existence of an outbreak requires demonstrating that the observed number of cases is significantly higher than the expected baseline for that specific population, place, and time. This step relies on comparing current surveillance data with historical trends, distinguishing true epidemics from normal fluctuations or pseudo-outbreaks caused by reporting changes.

34. (C) Conducting a randomized clinical trial
Immediate, early steps in a systematic outbreak investigation are descriptive and operational, including verifying the diagnosis, establishing the outbreak's existence, and constructing a working case definition. Randomized clinical trials, which evaluate the efficacy of specific medical treatments or interventions under highly controlled conditions, are not part of standard outbreak investigation protocols.

35. (A) Both A and R are true and R is the correct explanation of A.
Confirming an outbreak requires demonstrating that the current case count exceeds expectations for a specific period and location. This comparison is critical because seasonal surges, enhanced surveillance, or diagnostic changes can artificially inflate numbers. Recognizing these confounding factors allows investigators to rule out pseudo-outbreaks and confirm a true, active epidemic.

36. (D) The cases do not exceed baseline; an outbreak is not established yet.
Establishing the existence of an outbreak requires the observed number of cases to exceed the expected baseline for a given population, place, and time. Since the reported fifteen cases fall within the normal historical baseline of twelve to eighteen cases, there is no statistical evidence of an excess, and an outbreak cannot be declared.

37. (B) Steps in an outbreak investigation are always strictly sequential and cannot be conducted concurrently.
While outbreak investigations follow a systematic structural framework, the steps are highly dynamic and frequently occur simultaneously. For instance, investigators may implement immediate control measures while descriptive epidemiology is ongoing, or refine the case definition concurrently with laboratory analysis, demonstrating that the process is interactive rather than strictly linear.

38. (A) P-II, Q-I, R-IV, S-III
Outbreak investigations utilize distinct phases to identify and control diseases. Descriptive epidemiology characterizes cases by time, place, and person using tools like epidemic curves.

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differentiate outbreak-associated cases from other background illnesses, ensuring that only individuals with the target disease are included in the study.

59. (A) To exclude sporadic cases occurring outside the outbreak period.
Including a specific time window in a case definition is essential for restricting the analysis to the active outbreak. By establishing clear temporal boundaries, investigators can effectively exclude sporadic cases that occurred before or after the event, ensuring that the analytical study focuses solely on individuals exposed during the outbreak period.

60. (C) It dilutes study results by including non-cases, obscuring the source.
Maintaining an excessively broad, hyper-sensitive case definition throughout an entire investigation will lead to the inclusion of many non-cases. This misclassification dilutes the statistical power of the study and obscures the true exposure associations, making it highly difficult for investigators to accurately identify the contaminated food vehicle.

61. (D) Time, Place, Person
Descriptive epidemiology is built upon the three fundamental dimensions of time, place, and person. Analyzing these variables allows investigators to characterize the distribution of a disease, identify geographic clusters, determine the temporal pattern of spread, and identify high-risk demographic groups, which collectively provides the foundation for generating testable hypotheses.

62. (A) 1, 2, and 3
Descriptive epidemiology relies on tools that characterize the outbreak without testing causal hypotheses. Plotting epidemic curves analyzes the temporal distribution, using spot maps visualizes geographic clusters, and constructing demographic frequency tables describes the affected individuals. In contrast, logistic regression is an analytical statistical tool used to test hypotheses and estimate measures of association.

63. (B) Place – Spot map
In descriptive epidemiology, geographic distribution, or place, is standardly represented using a spot map. Plotting the physical locations of residences, schools, or workplaces of cases on a map allows investigators to visually identify spatial clustering, which can immediately point to localized environmental sources like contaminated water wells or specific restaurants.

64. (D) Conducting a randomized double-blind clinical trial
Hypotheses regarding the source of an outbreak are generated by reviewing descriptive data, conducting open-ended interviews with early cases, and studying historical outbreaks of similar pathogens. Randomized double-blind clinical trials are interventional studies designed to evaluate medical therapies, making them entirely inappropriate for generating initial epidemiological hypotheses during an active outbreak.

65. (A) Both A and R are true and R is the correct explanation of A.
Spot maps are essential descriptive tools in outbreak investigations because they plot case locations in space. This geographic visualization allows investigators to detect spatial clustering around specific local sites, such as water towers, retail stores, or restaurants, providing immediate, actionable clues to formulate hypotheses regarding the environmental source of contamination.

66. (C) The outbreak is a point-source exposure with a short incubation period.
A sharp, rapid increase in cases that peaks quickly and declines within twenty-four hours indicates a point-source exposure with a highly compressed incubation period. This pattern suggests that a group of people consumed a heavily contaminated food item simultaneously, resulting in a rapid onset of symptoms typical of pre-formed toxins.

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67. (A) Hypothesis generation relies strictly on laboratory sequencing, never on interviews.
Hypothesis generation in an outbreak investigation is an integrative process that combines descriptive epidemiology, open-ended interviews, and historical knowledge of similar pathogens. It does not rely strictly on laboratory sequencing. While molecular analysis confirms relationships, early interviews and demographic descriptions are essential for identifying potential food vehicles and exposure sources.

68. (A) P-II, Q-IV, R-I, S-III
Descriptive variables categorize outbreak data to identify patterns. Time represents when symptoms began, place identifies geographic locations such as a hospital ward, and person

While it alerts the international community and triggers temporary health recommendations, it does not legally compel member states to close their borders, as such measures often disrupt trade and aid unnecessarily.

128. (A) P-III, Q-II, R-I
The Integrated Disease Surveillance Programme tracks disease patterns using hierarchical reporting forms. The "S" form captures syndromic surveillance data collected by community health workers. The "P" form registers presumptive diagnoses based on clinical evaluations by medical officers, while the "L" form compiles laboratory-confirmed data from diagnostic facilities, ensuring a comprehensive data flow.

129. (A) The pandemic exposed vulnerabilities in plants due to close worker proximity and poor ventilation.
While SARS-CoV-2 is not a traditional foodborne pathogen, the pandemic exposed structural vulnerabilities within the food processing industry. Facilities like meat packaging plants faced massive outbreaks due to close worker proximity, low temperatures, and poor ventilation. This demonstrated that occupational health and biosafety are critical components of maintaining a secure food supply.

130. (C) Joint investigation by animal and human health sectors, with immediate notification to WHO.
Under the One Health and International Health Regulations frameworks, detecting a highly pathogenic zoonotic agent with potential human transmission requires immediate, coordinated action. Human and animal health sectors must launch a joint investigation to contain the source, while simultaneously notifying the World Health Organization within twenty-four hours to prevent a potential pandemic.

131. (D) Statement I is false but Statement II is true.
One Health is not restricted to veterinary medicine, but is a transdisciplinary approach addressing human, animal, and environmental health together. This framework is highly effective for monitoring antimicrobial resistance, as resistant pathogens cycle continuously between agricultural run-off, animal husbandry practices, food products, and human clinical settings, necessitating unified, multisectoral surveillance.

132. (D) One Health approach
Investigating Nipah virus by examining bat ecology, agricultural pig farming practices, and human clinical transmission represents a classic application of the One Health approach. This methodology acknowledges that managing emerging zoonotic pathogens requires active collaboration across human medicine, veterinary science, and environmental biology to effectively identify reservoirs and block transmission pathways.

133. (B) Public Health Emergency of International Concern
Under the International Health Regulations, the acronym PHEIC stands for Public Health Emergency of International Concern. This formal designation is applied to extraordinary public health events that present a significant risk to other states through the international spread of disease, necessitating a coordinated, rapid, and effective international response.

134. (C) To proactively mitigate threats at the animal-human interface before they become pandemics.
The primary objective of the One Health framework in epidemic preparedness is to proactively identify and mitigate threats at the critical interface of animal, human, and environmental health. By establishing integrated, transdisciplinary surveillance systems, public health officials can detect and contain zoonotic spillovers early, preventing localized outbreaks from escalating into global pandemics.

135. (D) Habitat destruction forces wildlife closer to humans, increasing zoonotic spillover risk.
Unplanned deforestation and rapid land-use changes disrupt forest ecosystems and destroy natural wildlife habitats. Consequently, displaced wild animals are forced into closer and more frequent contact with human settlements and domestic livestock. This increased proximity directly facilitates the transmission of novel sylvatic pathogens, significantly elevating the risk of zoonotic spillover epidemics.

136. (A) Health staff contacting healthcare facilities to actively seek out specific disease cases.
Active surveillance is a rigorous health monitoring method in which public health personnel directly contact healthcare providers, laboratories, or communities to seek out new cases of a specific disease. This proactive approach ensures complete

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population is unknown, relative risk cannot be computed, and the odds ratio is used.

79. (B) Administering clinical treatments to affected food handlers
Environmental investigations identify factors that allowed a pathogen to contaminate, survive, or multiply in food. Activities include inspecting kitchen facilities, reviewing raw ingredient sourcing, and collecting food and surface samples for testing. Administering clinical treatments to sick staff is a medical intervention, not an objective of environmental safety audits.

80. (A) Both A and R are true and R is the correct explanation of A.
Case-control studies are highly effective when the total size of the exposed population is unknown, such as during outbreaks linked to widely distributed commercial products. In this design, investigators compare exposures among a sample of identified cases with a representative sample of healthy controls, eliminating the need to identify every exposed individual.

81. (A) Retrospective Cohort Study
A retrospective cohort study is the most appropriate design when the entire population at risk is well-defined, such as guests attending a private wedding reception. Investigators can survey all attendees regarding their specific food consumption and health status, allowing for the direct calculation of food-specific attack rates and relative risks.

82. (C) Environmental swabbing should focus only on floors and ignore food contact surfaces.
Environmental investigations require comprehensive sampling to identify contamination pathways. Swabbing should focus intensively on food-contact surfaces, utensils, and equipment rather than ignoring them in favor of floors. Tracing ingredient origins and examining prep practices are critical, and testing patient leftovers provides direct evidence of the source.

83. (A) P-IV, Q-II, R-III, S-I
Analytical concepts help structure epidemiological investigations. Cohort studies compare disease rates among exposed and unexposed groups. Case-control studies compare historical exposures between ill and healthy individuals. Controls represent disease-free comparison groups. Recall bias occurs when cases, ruminating on their illness, remember past food exposures differently or more intensely than healthy controls.

84. (D) Aseptic techniques must be followed when collecting samples to prevent secondary contamination.
Collecting food samples requires strict adherence to aseptic techniques to prevent secondary contamination, which could invalidate laboratory results. Samples must be kept refrigerated during transport, not at room temperature, to stop pathogen multiplication. Environmental sampling is conducted in parallel with clinical studies, focusing on epidemiologically implicated items rather than random testing.

85. (B) Storing raw chicken above ready-to-eat salads in the cooler.
Storing raw meat, such as poultry, above ready-to-eat foods like salads represents a critical hazard. Juices from raw chicken containing pathogens can drip onto foods that will not undergo further cooking, causing cross-contamination. Correcting storage hierarchy, implementing separate prep boards, and verifying cooking temperatures are crucial kitchen control points.

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86. (C) Statement I is true but Statement II is false.
In a retrospective cohort study, investigators analyze exposure-specific disease rates by comparing the attack rate among the exposed to that among the unexposed. A calculated relative risk of exactly one indicates that there is absolutely no statistical association between consumption of the food item and development of the illness, contradicting any positive association.

87. (D) Undercooked beef is strongly associated with illness.
An odds ratio measures the strength of association between an exposure and a disease. A value of eight point five for eating undercooked beef indicates a very strong positive association with illness, meaning cases had much higher odds of exposure. Conversely, a value near one for raw milk suggests no significant association with the outbreak.

88. (A) Tracking a food product backward through the supply chain to its origin.
A trace-back investigation is an administrative and logistical process used to determine the origin and distribution path of a contaminated food product. By tracking the food item backward

contain sanguinarine, which damages capillary permeability and leads to severe edema, cardiac failure, and bilateral glaucoma, representing a classic chemical foodborne outbreak.

109. (D) Conducting clinical trials for new antibiotics
The Food Safety and Standards Authority of India is the primary regulatory body responsible for food safety, which includes tracing contaminated food supply chains, issuing product recalls, and publishing safety advisories. Developing or conducting clinical trials for new therapeutic drugs or antibiotics is a medical research function, fallling under clinical research bodies.

110. (A) Both A and R are true and R is the correct explanation of A.
The Integrated Disease Surveillance Programme mandates the immediate reporting of clustered diarrheal cases to detect potential waterborne or foodborne outbreaks early. Rapid notification is essential because it triggers the deployment of local Rapid Response Teams, allowing investigators to collect specimens, analyze transmission dynamics, and implement containment measures before the pathogen spreads further.

111. (B) Epidemic Dropsy
The presentation of bilateral lower limb swelling, cardiac symptoms, and gastrointestinal distress within a community, linked to the consumption of adulterated cooking oil, is highly characteristic of epidemic dropsy. This condition is caused by the accidental or intentional adulteration of mustard oil with Argemone mexicana seeds, which contain the toxin sanguinarine.

112. (D) The Indian Council of Medical Research (ICMR) enforces the Food Safety and Standards Act.
Under India's legislative framework, the Food Safety and Standards Act is enforced by the Food Safety and Standards Authority of India, along with State Food Safety Commissioners, rather than the Indian Council of Medical Research. The medical research council is responsible for biomedical research, diagnostics, and formulating clinical guidelines during public health emergencies.

113. (A) P-II, Q-I, R-IV, S-III
Major toxicological outbreaks in India are linked to specific contaminants. Epidemic dropsy is caused by sanguinarine in argemone seeds, and neurolathyrism is caused by beta-N-oxalylamino-L-alanine found in grass pea seeds. Aflatoxicosis results from ingesting toxins produced by Aspergillus flavus on damp maize, while ergotism is caused by Claviceps purpurea alkaloids contaminating grains.

114. (C) The "P" form relies on presumptive diagnoses made by Medical Officers.
The Integrated Disease Surveillance Programme utilizes structured reporting formats to track conditions. The "P" form is filled out by medical officers at health facilities, containing presumptive diagnoses based on clinical signs. The "S" form is used by community health workers for syndromic surveillance, and the "L" form registers laboratory-confirmed cases.

115. (A) Seizing food samples and auditing kitchen hygiene.
During a multi-disciplinary rapid response investigation of a school food poisoning event, a food safety officer's primary responsibility is to conduct environmental investigations. This includes auditing kitchen sanitation practices, examining food storage temperatures, and seizing representative food samples for immediate laboratory analysis, rather than performing clinical diagnoses or administering medical treatment.

116. (C) Statement I is true but Statement II is false.
The major outbreak in western India in nineteen seventy-four was indeed caused by consuming maize heavily contaminated with aflatoxins due to unseasonal rains and poor storage. Aflatoxicosis is certainly not a bacterial infection, but rather an acute or chronic toxic condition resulting from the ingestion of mycotoxins produced by the fungus Aspergillus flavus.

117. (B) Aflatoxicosis
The development of jaundice, ascites, and portal hypertension in a rural population consuming damp, poorly stored maize is a classic presentation of acute aflatoxicosis. This non-communicable toxidrome is caused by ingesting high levels of aflatoxins, which are highly hepatotoxic mycotoxins produced by Aspergillus species contaminating agricultural commodities under warm, humid conditions.

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investigators to match strains from clinical cases with those isolated from food.

99. (A) The difference in attack rates between exposed and unexposed helps pinpoint the vehicle.
In a cohort study, comparing the difference in food-specific attack rates between individuals who consumed a specific food and those who did not is essential for identifying the exposure source. A large difference in attack rates indicates a strong epidemiological association, whereas a minimal difference suggests the food item is unlikely to be the vehicle.

100. (A) Food A, because it has a significantly higher Relative Risk.
When identifying the contaminated food vehicle, investigators must prioritize the relative risk over the absolute attack rate. Food A has a relative risk of eight, indicating a very strong association with illness, whereas Food B has a relative risk near one, indicating no association despite its high attack rate, which occurred because almost everyone ate it.

101. (C) Statement I is true but Statement II is false.
Whole genome sequencing is a powerful tool in outbreak investigations because it provides high-resolution genetic fingerprinting to differentiate closely related pathogen strains. However, genetic sequencing does not make descriptive epidemiology obsolete. Molecular data must always be combined with epidemiological interviews to identify the specific food vehicles and exposure settings.

102. (C) 8.0
To calculate the relative risk of illness from consuming raw oysters, the attack rate among the exposed group is divided by the attack rate among the unexposed group. Dividing the eighty percent attack rate in the oyster-consuming group by the ten percent attack rate in the non-consuming group yields a relative risk of eight point zero.

103. (D) The proportion of consumers of a specific food who subsequently became ill.
The food-specific attack rate is defined as the proportion of individuals who became ill after consuming a specific food item out of the total number of individuals who ate that same food. This cumulative incidence measure is a critical tool in cohort studies, allowing investigators to compare risks across different menu items.

104. (A) To confirm the pathogen, which guides clinical treatment and directs precise control measures.
Seeking laboratory confirmation of the causative agent is critical because identifying the specific pathogen guides appropriate clinical management and patient treatment. Furthermore, knowing the exact biological agent allows public health officials to implement targeted, pathogen-specific control measures, such as determining proper sanitation protocols, estimating incubation periods, and tracing potential reservoirs.

105. (B) Overgrowth of other flora and pathogen death, causing false negatives.
Improper temperature control during the transport of clinical specimens can lead to specimen degradation. Elevated temperatures allow normal, non-pathogenic bacterial flora to multiply rapidly, overgrowing and outcompeting the primary target pathogen. This process can cause pathogen death or prevent its isolation in the laboratory, resulting in false-negative diagnostic results.

106. (B) NCDC (National Centre for Disease Control) / IDSP
In India, the National Centre for Disease Control, operating under the Ministry of Health and Family Welfare, is the primary nodal agency responsible for national disease surveillance. Through its Integrated Disease Surveillance Programme, the center coordinates a decentralized network that monitors epidemic-prone diseases, manages health data, and deploys rapid response teams during outbreaks.

107. (C) 1, 2, and 3
Outbreak surveillance and response in India involves multiple coordinated agencies. The Integrated Disease Surveillance Programme operates the decentralized surveillance network, the Indian Council of Medical Research conducts biomedical research and laboratory confirmation, and the Food Safety and Standards Authority regulates food standards and recalls. Bureau of Indian Standards does not calculate outbreak attack rates.

108. (C) Epidemic Dropsy – Mustard oil adulterated with Argemone mexicana.
Epidemic dropsy is a clinical condition historically reported in India, caused by the consumption of mustard oil adulterated with seeds of the weed Argemone mexicana. These toxic seeds

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through the supply chain from the retail outlet to the distributor, processor, and original farm, investigators can identify where contamination occurred and initiate target recalls.

89. (B) Collect targeted samples as soon as possible before they are discarded.
During an environmental investigation, food samples must be collected as quickly as possible before the implicated batches are consumed, discarded, or destroyed. Sampling should target open packages, leftovers, and raw ingredients linked to the outbreak. Waiting for the complete analytical epidemiology study to conclude is improper, as critical physical evidence will be lost.

90. (B) Cases may ruminate on exposures and over-report them compared to controls, skewing the Odds Ratio.
Recall bias is a systematic error that occurs when individuals who became ill spend more time reflecting on their past exposures than healthy controls. Consequently, cases may over-report their food consumption, while controls may under-report, artificially skewing the calculated odds ratio and making it difficult to identify the true contaminated food vehicle.

91. (A) (Number of new cases / Total population at risk) × 100
The attack rate is a specific measure of cumulative incidence used during outbreaks to quantify risk. It is calculated by dividing the number of new cases of disease by the total population at risk during the specified outbreak period, and multiplying the result by one hundred to express the value as a percentage.

92. (C) 1, 2, and 3
Relative risk values indicate the strength and direction of the association between an exposure and a disease. A value of one indicates no association. A value greater than one demonstrates that exposure is associated with an increased risk of disease, whereas a value less than one suggests a protective effect. A value of zero represents no risk.

93. (D) Staphylococcus aureus – 1 to 6 hours
Different foodborne pathogens have characteristic incubation periods based on their mechanisms of action. Staphylococcus aureus produces heat-stable pre-formed enterotoxins in food, leading to an extremely rapid onset of symptoms, typically within one to six hours of consumption. Bacterial infections like Salmonella require colonization and have longer incubation periods of twelve to seventy-two hours.

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94. (C) Magnetic Resonance Imaging (MRI)
Standard laboratory methods to confirm foodborne pathogens focus on isolating the agent or detecting its genetic material and antigens. Techniques include culturing the organism, polymerase chain reaction, serological assays, and whole genome sequencing. Magnetic resonance imaging is a medical imaging modality used to visualize internal anatomical structures, not to identify microbiological agents.

95. (A) Both A and R are true and R is the correct explanation of A.
A high attack rate among those who consumed a specific food does not prove it is the source of infection unless the relative risk is also high. If a food item is widely consumed by almost everyone, its attack rate will be high among both ill and healthy individuals, yielding a relative risk close to one.

96. (C) 75%
To calculate the food-specific attack rate for the potato salad, the number of individuals who ate the salad and became ill is divided by the total number of individuals who consumed it. In this scenario, dividing thirty ill consumers by forty total consumers yields zero point seven five, which corresponds to seventy-five percent.

97. (A) A Confidence Interval containing 1.0 indicates a statistically significant association.
In epidemiological analysis, a ninety-five percent confidence interval that includes the null value of one point zero indicates that there is no statistically significant difference in risk between the exposed and unexposed groups. For an association to be considered statistically significant, the entire confidence interval range must fall entirely above or below one point zero.

98. (A) P-II, Q-I, R-III, S-IV
Laboratory confirmation utilizes multiple methodologies. Serological assays detect specific antibodies or antigens, polymerase chain reaction rapidly amplifies DNA for pathogen detection, and bacterial culturing grows live organisms for identification. Whole genome sequencing provides high-resolution genetic profiling, allowing

118. (C) The ongoing, systematic collection and analysis of health data for public health planning.
Public health surveillance is defined as the continuous, systematic collection, analysis, and interpretation of health-related data. This core epidemiological process is essential for the planning, implementation, and evaluation of public health practice, allowing authorities to detect outbreaks early, monitor disease trends, and evaluate the effectiveness of control interventions over time.

119. (D) FSSAI handles food regulation, while ICMR provides clinical and lab expertise.
Robust coordination between regulatory and research agencies is critical during major foodborne emergencies. The Food Safety and Standards Authority of India possesses the legal authority to enforce food safety standards, traceback supply chains, and mandate product recalls. Concurrently, the Indian Council of Medical Research provides necessary clinical guidelines, advanced reference laboratory diagnostics, and research support.

120. (A) The contaminated food remains on the market, causing preventable illnesses.
A delayed report of a foodborne illness cluster by a local clinic prevents the timely initiation of an investigation. Consequently, the contaminated food vehicle remains on the market, allowing ongoing public exposure and causing additional preventable cases of illness, hospitalization, and potential death, illustrating the critical importance of rapid surveillance reporting.

121. (B) Integrated Disease Surveillance Programme
In India's public health framework, the acronym IDSP stands for the Integrated Disease Surveillance Programme. Launched with the assistance of the World Bank, this national programme is designed to strengthen disease surveillance systems through a decentralized, state-of-the-art network that detects early warning signals of impending outbreaks and facilitates rapid public health response.

122. (B) 1, 3, and 4
One Health is a collaborative, transdisciplinary framework that recognizes the deep interconnection between the health of humans, animals, and their shared environment. This holistic approach is essential for addressing critical global health challenges, including zoonotic spillover events, emerging pandemic threats, food safety issues, and the rise of environmental antimicrobial resistance across agricultural sectors.

123. (A) WHO – Primary agency responsible for declaring a PHEIC.
Under the International Health Regulations, the World Health Organization is the primary global agency responsible for coordinating international public health responses. The Director-General of the World Health Organization possesses the sole authority to officially declare an event as a Public Health Emergency of International Concern, based on advice from an emergency committee.

124. (C) The event originates from a laboratory leak.
The decision instrument of the International Health Regulations utilizes four main criteria to assess whether an event requires formal notification. These criteria evaluate whether the public health impact is serious, if the event is unusual or unexpected, if there is a significant risk of international spread, and if there is a risk of international trade restrictions.

125. (A) Both A and R are true and R is the correct explanation of A.
The One Health framework is a critical tool for global pandemic preparedness because a large majority of emerging infectious diseases are zoonotic in nature. These pathogens cross species barriers at the complex interfaces between humans, animals, and the environment, highlighting the necessity of integrated surveillance systems across ecological, veterinary, and human sectors.

126. (C) Implementing biosafety protocols, decentralized supply chains, and worker monitoring.
Managing major epidemic disruptions within the food industry requires enhancing supply chain resilience. Measures include implementing biosafety protocols in processing facilities, establishing decentralized supply chains to prevent single-point failures, and conducting health monitoring of workers. These strategies ensure food security and production continuity while protecting workforce health during public health emergencies.

127. (B) It legally compels member states to close all international borders permanently.
Declaring a Public Health Emergency of International Concern is a formal decision by the Director-General of the World Health Organization.

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captures demographic characteristics like age and occupation. Risk factors describe specific behavioral exposures, such as attending a banquet, which helps link cases to common activities.

69. (B) It identifies which demographic groups are at highest risk.
Person analysis in descriptive epidemiology evaluates demographic characteristics such as age, sex, occupation, and habits among cases. This assessment identifies high-risk groups within the population, providing vital clues about their specific dietary preferences or exposures, which directly helps investigators narrow down potential food vehicles for further analytical testing.

70. (C) A contaminated commercial ingredient is widely distributed to the chain.
When cases are geographically scattered across different cities but report eating at separate branches of the same restaurant chain, a localized contamination event is unlikely. Instead, this descriptive pattern strongly suggests that a contaminated raw ingredient was distributed widely from a central supplier to multiple retail locations, necessitating a trace-back investigation.

71. (B) Both Statement I and Statement II are false.
Descriptive epidemiology involves observing and characterizing the distribution of a disease by time, place, and person without utilizing a comparison group. In contrast, analytical epidemiology is specifically designed to test hypotheses, using comparison groups like cases and controls to identify statistically significant associations between exposures and disease.

72. (A) A widely distributed commercial food product is the likely vehicle.
A nationwide distribution of cases without local clustering indicates that the exposure is not linked to a single local event or municipal water supply. This spatial pattern suggests a widely distributed commercial food product, manufactured at a central facility and shipped across the country, is the vehicle of infection.

73. (B) A map marking case locations to identify geographic patterns.
A spot map is a descriptive epidemiological tool that plots the physical or geographic location of cases, such as their residences, schools, or workplaces. This visual representation allows investigators to identify spatial clustering, pointing toward potential localized environmental reservoirs, exposure sites, or point sources of contamination.

74. (B) They let cases mention exposures investigators might not have suspected.
Open-ended questionnaires are invaluable during the early, hypothesis-generating phase of an outbreak investigation. Unlike highly structured surveys, they allow cases to freely list all recent activities, meals, and purchases. This open approach helps investigators discover unexpected common exposures or unusual food vehicles that had not been previously considered.

75. (A) Different demographic groups have distinct dietary habits or food preferences.
Demographic differences in disease distribution, such as variations by age, gender, or occupation, often reflect distinct consumption habits or preferences. For example, certain foods are consumed predominantly by children, while others are preferred by specific occupational groups. Identifying these patterns in descriptive data directly points investigators toward likely food vehicles.

76. (C) Relative Risk
In a cohort study, investigators follow a defined group of individuals with known exposure statuses to observe who develops the disease. This prospective or retrospective design allows for the direct calculation of attack rates among the exposed and unexposed, which are compared to yield the relative risk as the primary measure of association.

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77. (A) 1, 2, and 4
Analytical studies are critical for testing outbreak hypotheses. Cohort studies follow groups based on exposure status to calculate relative risk directly. Case-control studies are highly efficient for undefined populations, comparing individuals with the disease to those without to calculate the odds ratio, as relative risk cannot be directly calculated in case-control designs.

78. (C) Case-Control Study – Odds Ratio (OR)
Different analytical study designs use specific measures of association. In a cohort study, where attack rates can be calculated directly, relative risk is the appropriate measure. In a case-control study, where the total size of the exposed

and timely data collection during an outbreak, minimizing the underreporting that commonly characterizes passive reporting systems.

137. (B) 1, 2, and 4
Standard, recommended control measures during foodborne outbreaks are designed to protect the public and halt transmission. These include recalling contaminated food products, temporarily closing implicated facilities, and issuing safety advisories to the public. Administering prophylactic antibiotics to an entire city population is medically inappropriate, as it risks severe side effects and antimicrobial resistance.

138. (B) Passive surveillance – Routine, provider-initiated reporting of notifiable diseases.
Passive surveillance is the most common form of disease monitoring, relying on healthcare providers routinely reporting notifiable diseases to health authorities. While highly cost-effective and simple to maintain, it is prone to significant underreporting. In contrast, active surveillance requires direct case-seeking, and sentinel surveillance utilizes selected sites to monitor disease trends.

139. (A) Permanently dismantling the local health department.
Post-outbreak reviews focus on identifying systemic weaknesses and improving future response capabilities. Standard activities include developing detailed After-Action Reports, identifying surveillance gaps, and mandating long-term food safety plans like Hazard Analysis Critical Control Point programs in implicated kitchens. Permanently dismantling the local health department is a destructive action that undermines public safety.

140. (C) A is true but R is false.
Active surveillance provides highly accurate, complete incidence data during an outbreak because health personnel proactively contact facilities to search for cases. The reasoning is false because passive, not active, surveillance relies on routine, voluntary reporting by busy clinicians, which frequently leads to substantial underreporting of mild cases.

141. (D) Establishing sentinel surveillance by sampling poultry from selected markets.
To monitor pathogen trends in food products without exhausting regulatory resources, sentinel surveillance is the most appropriate strategy. By regularly sampling retail poultry from pre-determined, representative markets rather than auditing every facility in the state, food safety departments can obtain high-quality, actionable data on contamination trends in a cost-effective manner.

142. (C) Control measures must always wait until the final outbreak report is published.
Control measures should be implemented as soon as sufficient descriptive or analytical evidence points to a specific source or transmission route. Waiting until the final outbreak report is drafted and published before taking action allows the contaminated vehicle to remain on the market, resulting in ongoing, preventable exposure and further cases of disease.

143. (A) P-III, Q-I, R-II
Public health control measures are categorized by their target of action. Removing contaminated food from retail shelves directly controls the contamination source. Pasteurizing raw milk and chlorinating municipal water successfully interrupts the transmission route of pathogens, while administering vaccines or post-exposure prophylaxis protect susceptible hosts from developing clinical disease following exposure.

144. (D) It documents lessons learned, what worked, and needed future improvements.
The foundational purpose of an After-Action Report is to document the events of the outbreak, evaluate the effectiveness of the response, and identify lessons learned. It serves as a constructive tool to highlight what strategies worked, what challenges were encountered, and what policy or procedural improvements are necessary to strengthen future responses.

145. (A) Initiate an immediate recall of the implicated batches based on epidemiological evidence.
When descriptive and analytical epidemiological studies provide strong, statistically significant evidence linking a food product to an active outbreak, regulatory authorities must initiate an immediate recall. Waiting for laboratory confirmation is a critical error, as delaying action while the pathogen is cultured allows continued

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public exposure, leading to preventable illnesses and deaths.

146. (C) Statement I is true but Statement II is false.
Sentinel surveillance utilizes selected health facilities or population groups to monitor disease trends and collect high-quality data cost-effectively. However, because it does not cover the entire population, sentinel surveillance is entirely unsuitable for identifying every single case of a rare disease, which instead requires comprehensive, nationwide active reporting systems.

147. (A) Mandate a rigorous HACCP plan focused on separate prep areas and verified temperatures.
Following an outbreak caused by cross-contamination in a restaurant kitchen, a food safety officer must mandate long-term corrective actions. Implementing a rigorous Hazard Analysis Critical Control Point plan focused on establishing physically separate preparation areas and verifying cooking temperatures addresses the systemic failures, preventing future recurrences of contamination.

148. (D) Monitoring health data from specific, pre-arranged sites to detect trends early.
Sentinel surveillance is a specialized disease monitoring system that collects health data from a selected network of pre-arranged, highly representative sites. Rather than monitoring the entire population, this strategic methodology is used to detect early warning signs of disease trends, identify outbreaks, and collect detailed clinical information in a highly resource-efficient manner.

149. (B) To stop the outbreak and prevent further exposure to the vehicle.
The primary, immediate objective of implementing control measures during a foodborne disease outbreak is to stop the ongoing transmission and prevent further public exposure to the contaminated vehicle. While identifying the pathogen and collecting clinical data are important steps in the investigation process, protecting public health by halting new cases remains the ultimate goal.

150. (C) To rectify the specific systemic failures, preventing similar outbreaks in the future.
Implementing long-term corrective actions, such as policy reforms or infrastructural modifications, aims to address the systemic vulnerabilities exposed during an outbreak investigation. While immediate control measures halt the active crisis, these permanent interventions rectify the root operational failures across the food supply chain, ensuring that similar contamination events are prevented.

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